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[OFFICIAL NOTICE.]

Wrinkle Department, Pacific Coast Gas Association.

OFFICE OF EDITOR, WRINKLE DEPARTMENT,
PACIFIC COAST GAS ASSOCIATION,
1050 J STREET, FRESNO, CAL., May 14, 1902.

To the Members of the Pacific Coast Gas Association: As the Ninth Annual Meeting of the Pacific Coast Gas Association is drawing near, it behooves me, as the Editor of your Wrinkle Department, to remind you that it is time you were sending in your contributions to this department.

Wrinkles mean any small or large device, original in idea if possible, or anything that is not generally known to the gas fraternity, and that will in any way alleviate the trials and troubles of the gas man and promote his welfare and happiness, will be acceptable as a Wrinkle. If you will send in a sketch, photo or drawing, with explanation, it will be fully appreciated at our meeting this summer, as it depends entirely on the contributions, and following discussion of the members, to make these meetings successful.

Now, please, do not be backward, but send in all the Wrinkles you can gather up at once, and before you forget it. You may sign your name or not; just as you like. You surely have around your works, office, or main and service system a lot of original ideas that would be a benefit to some other member who is working under the same conditions.

Kindly make your contributions to this department at once, so as to enable me to get them in order before the meeting. Expecting an early reply, I am,

Yours truly,

GEORGE S. COLQUHOUN.

BRIEFLY TOLD.

ECHOES FROM THE NEW ORLEANS MEETING.—Little remains to be said respecting the 25th meeting of the Western Gas Association, for the telegraphic story of it, as told last week by our correspondent, was lengthy enough to show the quality of the gathering and the records that were made. One thing, however, that was overlooked was the naming of the gentlemen chosen to act as Directors for the ensuing year. They are Messrs. John Somerville, Paul Doty, Robert Young, Jr., and George E. Clarke. One of the pleasantest bye-occurrences of the sessions was the presentation of a handsome set of silverware to Mr. O. O. Thwing, of St. Louis, as some recognition of his splendid work in connection with the compiling, editing and publishing of the proceedings of the Association, which have been completed, and are in the hands of the members, back to the meeting of 1887. The presentation was not made by the Association, but was the pleasant, self-imposed personal task of several members who thoroughly and practically appreciated the value of Editor Thwing's work. The recipient was quite taken aback, which sort of exhibition is not all in keeping with his usual way in the walks of life. As the donors seem to prefer that no individual mention be made of their share in the presentation, we discontentedly submit to their desires in the premises; but we cannot re-

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frain from congratulating them on the tact and fraternality that covered the giving and inspired the gift. Some comment was made on the fact that Mr. A. H. Barret, who was in line for promotion to the Presidency, and who was so promoted, did not attend the sessions. The clever engineer of the Louisville Gas Company, and a further portion of whose burden is the directing of the electric lighting supply of Kentucky's biggest city, had troubles of his own. The week prior to the convention a howling wind storm leveled the Company's main or trunk pole line, so that the outfit was "working on one leg," so to speak, with Mr. Barret in personal charge of the reconstruction. Putting the work done and the results accomplished together, the Western's 25th meeting was a valuable one; but we think it is safe to predict that it will be some time before the convention is again held in an extreme southern location.

NOTES.—Mr. W. H. Fritchman, Manager of the Citizens Gas and Electric Company, of Council Bluffs, Ia., reports a brisk placing of cooking ranges this summer. The Company sells the ranges at a trifle over cost—less than 5 per cent. of it—and connects them without charge.——At the annual meeting of the Owosso (Mich.) Gas Light Company the officers elected were: President, C. S. Williams; Treasurer, J. C. Lear; Secretary and Manager, Sedgwick Dean; Superintendent, A. Birk. The official reports showed that a sensible gain had been made in sendout over the past year, that the average price received per 1,000 cubic feet was $1.21, and that 3½ per cent. represented the charge made on leakage and condensation account.——The sale of the San Jose (Cal.) Light and Power Company to the United Gas and Electric Company, of San Francisco, was completed the afternoon of the 21st ult. It is understood that the proprietors of the San Jose Company received the price of $42 per share for their holdings.——The proprietors of the Ogdensburg (N. Y.) Gas Company have called in the first mortgage bonds on that property. The mortgage which amounts to $20,000, was terminated the 1st inst.——The operation of the public electric lighting plant at Alameda, Cal., showed a loss of $1,529.06 for the month of April.——Mr. P. M. Downing, Manager of the Colusa (Cal.) Gas and Electric Company, has been authorized to make the announcement that, until further notice, the rate for a supply of gas on fuel account will be $2.50 per 1,000 cubic feet, subject to a discount of 50 cents per 1,000 in the instance of bills paid at the office of the Company on or before the 10th of the month. It is further provided, however, that a minimum use of 500 cubic feet per month must be recorded.——Work is brisk at the factories of the Hazelton Boiler Company, Rutherford, N. J. Among the orders recently booked these are noted: Three boilers of 450-horse power for the Carlton Paper Mills, Passaic, N. J., and an additional 150-horse power boiler for the Meriden (Conn.) Electric Light Company. When the latter order is filled the Meriden Company will have an equipment of Hazelton boilers aggregating 600-horse power.——At the annual meeting of the Portland (Me.) Gas Company the shareholders had good reason for congratulating themselves over the results of the year's working, as shown in the respective reports submitted by President E. H. Daveis and Engineer E. H. Yorke. The sendout for the twelvemonth (the Company's fiscal year ended April 30) was 109,002,000 cubic feet, as against 99,868,000 cubic feet for the previous year. The unaccounted-for gas was returned at 7 per cent.—the average on such account for the past 10 years was 11 per cent. The materials used in manufacturing were: Gas coal, 6,556 tons; gas naphtha, 173,399 gallons; anthracite coal, 647 tons. The residuals produced were: Coke, 96,643 bushels; tar, 2,674 barrels; ammoniacal liquor, 20,592 gallons, 16-oz. strength. The illuminating power of the gas averaged 22.67 candles. Considerable was done in the way of plant betterment, and the changes in the main system necessitated the placing of about 5 miles of pipe. The most notable item in connection with the latter work was the piping of many of the streets of Deering, an outlying borough which is rapidly growing in population. The gain in meters for the year was 585. During the year 1,256 gas ranges, small cookers and heaters were placed, and 1,274 incandescent gas lamps were sold; 97 lamps of the arc gas type were installed. New services to the number of 358 were laid on. Welsbach street lamps in use are returned at 345. The contract for a duplicate set of water gas apparatus was awarded to the United Gas Improvement Company, which installation will require an addition to the generating house. President Daveis, in referring to the improvements brought to completion during the year, says: "All the improvements named herein have been carefully considered by the Directors, and have been planned and carried out by our Engineer with skill, energy and economy." The election showed no change in executive management of the Company, the affairs of which are certainly in excellent shape.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.]

PROCEEDINGS, TWENTY-FIFTH ANNUAL MEETING, WESTERN GAS ASSOCIATION.

HELD IN THE NEW ST. CHARLES HOTEL, NEW ORLEANS, LA., MAY 21, 22 AND 23, 1902.

FIRST DAY, MAY 21.—MORNING SESSION.

The Convention was called to order at 10 A.M., May 21, by the President, Mr. Thomas D. Miller, of Dallas, Tex. The Secretary (Mr. J. W. Dunbar, of New Albany, Ind.), occupied the Recorder's desk.

The President announced that as the Mayor of New Orleans, who was to have formally welcomed the Association to the city, had been unavoidably detained by pressure of official business, the regular order would be proceeded with. It was agreed that the roll call be postponed to the second day, and that the election of new members be likewise postponed. The President, however, invited all those present who had applied for membership to take part in all the privileges of the meeting.

A motion to dispense with the reading of the minutes of the last annual meeting was adopted. In the absence of the First and Second Vice-Presidents, Mr. E. H. Jenkins assumed the Chair, whereupon President Miller read the following

INAUGURAL ADDRESS.

Gentlemen of the Western Gas Association: It is with pleasure and pride I greet you this morning, the 25th anniversary of the Association. It is an added pleasure to welcome so many of my Northern brethren to this fair Southland. Many meetings of the Association have been held on the extreme northern border of our great Republic, but this is the first meeting ever held in a State forming part of our southern boundary.

New Orleans; the Mecca of the old South, the land of beauty and chivalry! Her importance has always been recognized; her position at the mouth of the greatest navigable stream on the Continent, if not in the world, has made her desirable in times of peace and war.

To-day New Orleans presents more novel features in the gas business than any other city in the world. Here you will find the most phenomenal increase in the growth of sendout in a few months known in history.

You can see an innovation in the distribution of gas under high pressure to reinforce a distributing system grown inadequate to the demands of this phenomenal increase in sales. There is now contemplated a high pressure supply line for Algiers, a city across the river. This main will be laid on the bottom of the river, which reaches a depth as great as 125 feet. The distribution is to be made through governors, direct from this high pressure line into the low pressure system of mains, obviating the necessity of a storage holder in Algiers.

We are 25 years old to-day, and it is well that we should take stock of the work of this body with a history covering a quarter of a century and, reasoning by analogy, predict what is in store for the future.

There is an old saying, "If you are not strong at 20, rich at 30 and wise at 40, you need not expect to be strong, rich or wise." And while it may not be any more of a truism than other saws we are in the habit of swearing by, it has at least as much value.

Many of you remember the 20th annual meeting, held in Cincinnati in 1897; but a moment's reflection will recall the strength of the Association in numbers, interest and thought, as portrayed in papers presented and the discussion which followed. Subsequent meetings fully sustain the conclusion that the Association was strong at 20. Will it be rich at 30? In wealth of literature and experience no doubt can exist that such will be the case, with the Thompson Library for a foundation, and the evident interest of the members. This Association should possess a library, a veritable storehouse of wealth, for the one seeking enlightenment in any department of the profession of gas engineering.

Will the Association be wise at 40? Many of the wise patriarchs here to day will have joined the great majority ere then, and the younger men of to-day will have taken their places. If the advance of the work of this Association is as great in the next 15 as it has been in the past 15 years, as portrayed by its published proceedings, no one can doubt that we will be wise at 40. We will be wise at 40 if we continue to keep the good of the Association in the foreground, and not allow personal prejudice to cloud our vision, or foolish pride to warp our judgment.

The addresses of the passing presidents of the Association are an excellent index of the progress of the work of the Association. I have reviewed them, and shall make use of them in this address.

No one subject has received attention oftener than the welfare of the

Association. While the desirability of two meetings a year seems to have been generally recognized, the impracticability of it has been a bar to its adoption. Much has been said about the desirability of increasing the membership, and I want to reiterate it all. There are many active men who would attend these meetings if they could afford the expense, and their employers, who would get the benefit, will not consent to the outlay. Is this because these owners are not informed of the advantages of having their superintendents or managers go to these meetings, or are they superior beings who can give all the information that any of their men may require? If the former, why not educate them? If the latter, why not convince them of their error, if possible?

It is interesting to note how the subjects considered of live importance by the Association have swung from almost purely technical ones to a larger consideration of business methods and policies; not that the technical has not had its share, but that other timely subjects have had theirs.

Secretary.—Many times in the past the necessity of a good, active and competent Secretary has been mentioned, and the obligation under which the Association rests to the only two Secretaries I have known, has been adverted upon many times, and I feel that the majority of the members fully appreciate that the measure of the success of our meetings is directly attributable to our Secretary.

New Members.—At every meeting we elect a number of new members, and from my own experience I feel like saying a few words to the novices. You come here for the benefits you may derive from contact with your fellow gas men. Modesty is a commendable trait, but do not allow it to stand in the way of your accomplishing the object that brought you here. If you want to know anything, the quickest and best way to get that information is to ask for it; not that it is necessary to bring it up in meeting, for some of the best results are obtained in the quiet, confidential talks between sessions. On the other hand do not hesitate to take part in the discussions, for you may have something of value for some one else.

Proceedings Published.—The Third Volume of "Proceedings" was mailed to the members last month. This volume covers the meetings from 1887 to 1891, inclusive.

The two previous volumes cover the meetings from 1892 to 1898 inclusive. The committee having charge of this work has been continued from year to year, and from the character of work shown should be continued as long as its members will serve, for the three volumes show great care in their preparation and very skillful editing. Too much praise cannot be bestowed on those whose labors have been so faithful and the accomplishment so much. Usually, in committee work, a few members do most of the work, and in this instance the whole of the labor has fallen on one man, and the laurels won by this committee must be woven into one wreath and placed upon the brow of Mr. O. O. Thwing, of St. Louis.

The Gas Business.—The gas business has seen its years of depression and prosperity, but there is hardly anything in history that will compare with the prosperity of the past year, and what it will bring forth the coming year.

The Government statistics of 1900 on the gas business present many interesting features, and I briefly offer a few for your consideration.

Thirty per cent. of the gas plants of the United States are operated in conjunction with electric plants.

There was an increase in the value of the products of the gas plants of the country in 10 years, from 1890 to 1900, of 32.9 per cent., while the increase in the capital invested was 119.1 per cent., and the quantity of gas sold increased 83.7 per cent.

The average capital invested in gas plants per establishment in 1890 was $348,749, while the same item for 1900 shows $643,522, or nearly double; and yet over 52 per cent. of the gas establishments of the country are in cities and towns of less than 10,000 inhabitants, and nearly half of these are in towns of less than 5,000 inhabitants.

Manufacture and Sale.—Marked reductions in cost of manufacture have been made in the past 25 years, but distribution cost has increased, if it has changed at all. This comes from more efficient apparatus increasing the yield from the unit of crude material and the yield per unit of generating apparatus and per employee; also, from increased sales and the consequent reduction of cost in making the larger quantities; while, on the other hand, the sale per meter has gradually fallen, and a more careful attention to a larger number of consumers has increased the cost in this department, added to an increase in amount paid for taxes, bonuses, etc., in many cases. No other industry in the land has made such sweeping reductions in selling prices and yet maintain the integrity of the investments as have been made in the gas business all over the country, and too much credit cannot be given to those whose minds have contributed to make this possible.

The following table has been compiled from Government statistics and shows growth of the gas business since 1850, the reduction in value of products and increase in investment:

	1850.	1860.	1870.	1890.	1900.
*No. companies reporting	30	221	390	742	877
Total cost of products	898,758	5,989,166	17,416,107	32,479,266	53,084,174
Total value of products	1,921,746	12,016,353	32,048,851	56,987,290	75,716,693
Ratio of cost of product to value	2.15	2.00	1.84	1.75	1.42
Capital invested to produce each $1 val. per year	3.47	2.40	2.24	4.54	7.49
Average price of gas per 1,000 feet	....	....	....	1.42	1.035

* 1880 was not reported.

Municipal Ownership: Government Supervision.—In President Fullager's address, in 1887, I find this language: "Whether it is best to permit the present outcry to continue and to submit to all the petty annoyances of local politicians, or to face a new and untried commission that will, of necessity, be of a political nature, is what the gas fraternity must decide." This was written almost 15 years ago, and how nearly does it describe the situation of to-day. This Association is committed to the general idea of State supervision of gas companies. It has been repeatedly advocated and indorsed, and one year a committee was appointed on special work of this chararter. Such committee should be continued and its work encouraged.

While objecting to municipal ownership, and believing it to be pernicious and unwise, not only as being inharmonious with a republican form of government, but also unsound as a business proposition, we should be in a position to offer something better, and with convincing arguments to sustain it. This work must be carried on in each State separately, and this committee should work in conjunction with the State Associations. Legitimate lobbying in legislative bodies is desirable and necessary, in order that representatives may be informed on special subjects, and those best posted on any line should be the ones to impart this information, else it is apt to be obtained from unreliable and incompetent sources.

Coal.—There has been a general complaint as to the poor quality of coal being furnished throughout the whole country. Numbers of reasons have been assigned for this condition of affairs. Operators claim an increase in cost of production, and a consequent rise in price followed, but what seems paradoxical, the quality deteriorates at the same time. This condition seems to be partially accounted for in that practically all the mines of the country are now paying the miners on a basis of mine run coal, whereas before payments were made on the screened, lump basis; there was then inducement for the miner to exercise some care in cutting, chuting and loading his coal. As it is now, no such incentive exists. Everything that goes into the car is paid for regardless of quality.

Water Gas.—There is but little issue now on the value of water gas. Some of the most vigorous objectors of a few years ago only are now advocates of its use. The developments of the Ohio and Indiana oil fields did much to stimulate the installation of water gas apparatus over a large section of the country, and it is but reasonable to expect that the Beaumont field will have a similar influence on a much more extensive area of country, because of the fabulous quantities of oil, its proximity to seaboard, and the fact that it does not offer, as yet, much to the refiner. Its value as a gas maker will be before you for discussion, and the local plant offers you ample opportunity to witness it in practical operation.

Fuel Gas.—It is a demonstrated fact that natural gas supplies fail in time. It is only a few years since this storehouse of nature has been drawn upon, and several fields have already failed. There does not seem to be sufficient cause for anyone to feel greatly alarmed at the proximity of a natural gas field. The natural gas may take away many of your fuel customers and some of your light consumers, but the life of the field will be in an adverse ratio to the cheapness of the gas and amount of the consumption. When it does fail your business will double in a geometrical progression. Once let a community become accustomed to using gas for fuel and it will not discontinue.

The South is the ideal land for the gas stove, and the only reason that the quantity of gas sold for fuel purposes in the South is not greater is that its comforts and economies are not appreciated.

Electric Lights.—Electric lights have done more to stimulate the gas industry than any other one thing. Such a popular competitor made it not only desirable but necessary that the marked improvements of the past decade be made. It resulted in the pushing into new fields and the rapid development of the fuel end of the gas business. Since the perfection of a reliable watt meter the electric light companies are rapidly adopting it, and are thereby putting the light on a footing with the gas light, where exact comparisons can be made. I predict a gradual increase in the gas sold for illuminating purposes as the watt meter comes into more general use.

Nernst Light.—More than three years ago it was announced that an electric lamp had been invented which was destined to reduce the consumption of electrical energy per unit of light, as much as the Welsbach lamp reduced the consumption of gas per unit of light. This was to be accomplished in a method very similar to the one used by Welsbach, only electrical energy was to be used instead of thermal energy of gas.

This Nernst lamp has now been perfected into a commercial article. The makers of the lamp claim an efficiency of about 3.5 watts per candle power, which, as compared to the ordinary incandescent electric lamp, is very near the same, and is about 50 per cent. more consumption than the inclosed electric arc with clear globes, which has an efficiency of 2 to 2.6 watts per candle power. The consumption of 3.5 watts electric lamps, producing 100-candle power, is 350 watts per hour, which, at 10 cents per kw., would be 3½ cents per hour. The cost of 100-candle power by the Welsbach lamp, with gas at $1.50 per 1,000 feet, is ½ cent. Therefore, the electric incandescent costs 7 times as much for the same amount of light. Suppose one part is dropped to cover cost of renewals, another for the convenience of the electric light, and another part for the amount of heat made by the Welsbach in excess of the electric light, we still have the incandescent gas lamp one-quarter as expensive as the incandescent electric.

The best new cluster arc gas lamps will compare very favorably with the 450-watt, alternating arc lamp. The cost of operating with current and gas at the prices already named is about 2½ cents per hour for the gas, against 4½ cents per hour for the electric lamps. As a matter of fact, the gas arc gives a far superior illumination, and is equally convenient. It is, therefore, but to conclude that, until the Nernst lamp shows much higher efficiency, it must not be regarded as any more of a competitor than the familiar forms of electric lamps.

World's Fair.—The Louisiana Purchase Centennial Exposition, which was to have been held in 1903, has been postponed until 1904. This will, without doubt, be the greatest exposition held in the history of the world. It is not probable that there will be another such exposition in this country for many years, as the event this exposition is to celebrate is the last centennial of great national events in the history of the United States until the second centennial of the Declaration of Independence. The magnitude of the gas interests of this country is sufficient to warrant a united effort being made to have a special exhibit by the gas industry of America, if not of the world, in space allotted to it. The American Gas Light Association has already taken steps to this end, and I recommend that a committee be appointed to represent this Association and act in conjunction with the representatives of that and other Associations.

Electrolysis.—The destruction of gas and water pipes by stray electric power currents has received considerable attention during the past year. Several suits have been filed, and as far as they have progressed decisions have been rendered in favor of the damaged pipes. At this time there has not been a case of this kind passed upon by a Supreme Court, and so far as one can judge it is not likely there will be, as there seems to be a general tendency on the part of the street railway owners and operators to compromise such cases before they get to the court of final resort.

Papers for Meetings.—You will note that the subjects to be discussed at this meeting are quite extensive in the field covered. Construction, operation, distribution and maintenance, are all to be handled by men selected for their peculiar fitness to discuss their respective subjects, while the Wrinkle Department is in the hands of a competent editor.

During the past winter Vice-President Barret called my attention to a practice in two similar Associations to this, which seems to give satisfaction, and certainly is calculated to bring great benefit to the Association. Instead of the committee appointed for the purpose, inviting members to contribute papers for the next meeting, this committee is empowered to assign subjects to members with the understanding that such an assignment imposes a duty for such members to perform, and failure would be dereliction on the part of the one thus designated.

My attention was also called to a practice of assigning the same subject to two or more members, thus having placed before the meeting the thoughts of at least two members, thereby expanding the field of view and opening up more channels for discussion. I, therefore, recommend that proper amendments be enacted to give the Executive Committee such power as indicated, and I feel sure their work can then be more satisfactorily performed, with less annoyance and much benefit to the Association.

Necrology.—In the 25 years of existence of this Association, the Presidents have recorded the deaths of 50 of its members, an average of 2 each year. During the past year we have lost 3 members who were known either personally or by reputation to every gas man in the land; men who were pioneers in their respective lines:

Mr. T. G. Russell, Treasurer of the Parker-Russell Mining and Manufacturing Company, died at St. Louis, Mo., May 26th, 1901.

Col. W. E. Barrows, President of the Welsbach Company, died at Philadelphia, Pa., July 30th, 1901.

Mr. William Wallace Goodwin, formerly identified with the Goodwin Meter and Manufacturing Company, died at Bordentown, N. J., October 6th, 1901.

It is but proper that this Association should express the high esteem in which these gentlemen were held, and I recommend that a committee be appointed to prepare suitable resolutions to be presented at this meeting.

Conclusion.—I would be recreant to my own feelings should I close this address without acknowledging my indebtedness to the many friends who have so willingly aided me in my career in the gas business, and to all of the members of this Association I desire to express my most profound gratitude for the honor conferred on me, and for their hearty co-operation and support during my term of office.

COMMITTEE ON PRESIDENT'S ADDRESS.

A round of applause followed the reading of the address, which was referred to a committee of three for consideration and report. The Chairman appointed as such committee Messrs. E. G. Cowdery, George F. Goodnow and J. B. Howard.

APPOINTMENT OF SPECIAL COMMITTEES.

President Miller resumed the Chair and announced the appointment of the following special committees:

On Memorials.—Messrs. Paul Doty, John Gribbel and John Dell.

On Final Resolutions.—Messrs. F. B. Wheeler, R. Norris and Wm. E. Steinwedell.

THE REPORT OF THE BOARD OF DIRECTORS,

was read by Secretary Dunbar, as follows:

To the Members of the Western Gas Association: The annual meeting of the Board of Directors of the Western Gas Association was held at 10 A.M., Tuesday, May 20, 1902, at the new St. Charles Hotel, New Orleans; Mr. Thos. D. Miller, the President, presided.

Those present were: Messrs. Thos. D. Miller, F. H. Shelton, William McDonald and James W. Dunbar.

The Treasurer submitted his annual report. [The report showed a total receipt for the year of $2,458.22; an expenditure of $2,372.99; and a balance of $85.23.]

On motion of Mr. Wm. McDonald, the following papers were accepted for presentation to the Association:

"Experience with Bench Fuels," by Mr. W. A. Baehr.

"Beaumont Oil for Gas Making," by Mr. John H. Fitzgerald.

"Gleanings from Abroad: Including the Latest about Inclined Retorts," by Mr. Frederic Egner.

"Gasholder Specifications," by Mr. H. A. Carpenter.

"Electrolysis of Underground Metals," by J. M. Humiston.

"Distributing Gas at High Pressure," by Mr. Geo. F. Goodnow.

"Gas Engines," by Mr. C. H. Nutting.

"Current Purifier Practice, and a New Form of Construction," by Mr. F. H. Shelton.

"Some Experiences in New Orleans," by Mr. Bankson Taylor.

"Wrinkle Department," edited by Mr. W. E. Steinwedell.

On motion of Mr. McDonald it was adopted that in the future the Committee on Next Place of Meeting report, submitting to the Association the names of not less than two or more than three cities as suitable for the succeeding Association meeting, the members then to make any selection deemed proper.

The Board reported, in reference to the change of meeting place to New Orleans, that certain conditions existing, and in view of the urgent invitation of the New Orleans Lighting Company to hold our meeting in New Orleans, they deemed it proper to inform members of the existing situation requesting their vote upon the proposition to change. This ballot resulted in a three-quarter vote in favor of New Orleans, and, in

accordance to the recorded wishes of a majority of the members, the meeting place was so changed.

The President appointed the following committees:

On Auditing.—Messrs. Wm. McDonald, F. H. Shelton and J. B. Howard.

On Introduction of Visitors.—Messrs. J. B. Howard, Donald McDonald and Geo. McLean.

On Membership.—Messrs. Wm. McDonald, W. H. Barthold and O. O. Thwing.

There being no further business, on motion the Board adjourned.

JAS. W. DUNBAR, Secy.

The report was received and adopted. The report presented by the Auditing Committee, certifying to the correctness of the Treasurer's accounts, was also ordered accepted and filed.

Report of Library Committee.

Mr. F. H. Shelton, on behalf of the Library Committee, made the following verbal report:

Mr. President and Gentlemen: I would report for the Library Committee as follows: You will recall that a year ago this Association, with the purpose of building up a large, comprehensive and helpful library for the benefit not only of our members, but of other accredited gas men who, by proper arrangement, might make use of such an institution, created a Library Committee, and gave it pretty broad powers in the way of expenditures for the purchase of books, etc., to equip such an Association library. During the year the nucleus of that library, donated by the late Mr. George Treadway Thompson, has been duly installed with the Secretary at New Albany, catalogued and listed, and bulletins, I believe, of the books on hand have been sent to all our members. During the year, moreover, there have been a number of contributions from different members, helping to build up the library; and I want to emphasize to you the importance of such "team work" on the part of our membership. We cannot get a good library of 400, 500 or 600 volumes, covering the current and all of the best thought upon practical questions that we want to dig out and study to-day, unless we do our part, each one of us, to get together such books; and I think that where each of us having one or two or a dozen books that are suitable and appropriate, should see to it that they get into the Association library, so that all of our members may have the benefit of them. It is a very little to each of us, but it means a good deal in the aggregate. I want to illustrate the helpfulness of such action, for instance, on the part of our most esteemed "Uncle Jerry" Howard, who has donated to the library, the first 4 volumes of the AMERICAN GAS LIGHT JOURNAL, which, I believe, was started in the year 1859. Mr. Howard has also donated 2 or 3 of the first volumes of Clegg and Peckston, and some of the early English writers who wrote in the 20's and 30's. These books are almost priceless, and very helpful in the study of many back questions. Mr. William McDonald, of Albany, N. Y., also donated several volumes. That's the way to build up a library and to build it up quickly; and we ask all of you to please keep the good work moving on. Quarterly or semi-annual bulletins will be sent out, giving credit for new books received and information as to everything we have on hand to assist in the looking up of any particular question. Now, regarding the index to our gas literature, which the Association undertook or authorized a year ago, I regret to have to make the report which I very reluctantly submit. The Library Committee authorized the putting of the work in the hands of Mr. Frederick Egner. He debated the matter for some time during the past winter and spring, and finally decided to undertake the work and devote his time to it. We felt that he was a most appropriate and suitable man for the task, being naturally studious and given to the literature and writings of our business, and capable of getting up this index which we wanted for handy reference to most excellent advantage. Therefore the work was put into his hands; but because of reasons which, perhaps, it is not necessary to here go into detail upon, Mr. Egner felt that after all he could not continue the work, and so he gave it up, very unexpectedly, to your committee. It is quite a long story, and it is not worth while here to relate the details, but the net result is that the work, after having been started and apparently successfully launched, fell back into *statu quo* after all. It then became necessary to substitute someone else to take Mr. Egner's place. This has just been done by the committee; and it is believed that the first batch of index cards will be forthcoming in probably 60 days. The committee is very much disappointed that so much time slipped by without the practical results of the work authorized a year ago being in the hands of the members; but we think you know the committee well enough to feel that it has done the best it could under the circumstances. I want to say that this library index of gas literature idea has received excellent support. A great many contributions and subscriptions have been made toward the library, and the fund is in good shape to push through the work of getting out this card index, for all the members have subscribed in excellent style. I don't mean to debar you, however, from further contributions and subscriptions, for the more funds we have in hand the better the work can be done. I simply want to say that there is enough on hand to insure the success of the index, which, you will remember, means a series of 6,000 reference cards to the library and various articles pertaining to our business for each subscriber. I think that covers the ground. As I say, the members will receive in the next 60 or 90 days the first batch of the card index that has been promised and is now forthcoming.

On motion of Captain White, the report was received, with thanks for the work evidenced by it, and the committee was continued.

Reading the Papers.

The President said that the paper list had been reached in the regular order, and that he would call upon Mr. W. E. Steinwedell to read the paper on

EXPERIENCES WITH BENCH FUELS,

by Mr. W. A. Baehr, of Denver, Col., who was unable to be present at the meeting.

Mr. Steinwedell read as follows:

Early in September, 1901, we began a series of experiments at the gas works in Denver, Col., with the object of finding a suitable bench fuel to replace the coke theretofore used for that purpose. This was done not only to increase the quantity of coke for the market, but also to lessen the cost of bench fuel. Colorado produces a number of lignites and semi-caking bituminous coals, from which we selected such kinds for experimental purposes as we thought would serve.

We have full depth, recuperative benches of sixes, with retorts 15 by 26 inches, and 9 feet long inside. Each retort carbonizes 2,000 pounds of coal per day of 24 hours, with 4-hour charges. We use Sopris lump gas coal from near Trinidad in Southern Colorado. For the tests we selected a bench which had been recently rebuilt from the ashpan up and which was in fair condition. Our drawing and charging are done by hand.

In the results given in this paper all determinations are reduced to per cent by weight. The gas analyses were made with a small Orsat apparatus, 100 cc. capacity, and also with Cooper's tubes or eudiometers. The absorbent solutions used in the determinations were the same as those recommended by Prof. Lord, of the Ohio State University, which are as follows:

For CO_2, a 16 per cent. solution of KOH. This acts very rapidly and completely, and also absorbs H_2S and SO_2 if present.

For O, an alkaline solution of pyrogallic acid, $C_6H_3(OH)_3$. Dissolve 20 grm. in 100 cc. H_2O. Keep in a tight bottle. When about to use, mix this solution with its own volume of the KOH solution.

For CO, dissolve 15 grm. of Cu_2O, the red oxide of copper, in 100 cc. concentrated HCl, specific gravity 1.19. Keep this solution in a glass stoppered bottle, with some scraps of metallic copper.

In order to obtain uniform comparative analyses we used nothing but the above solutions in all our tests. The temperatures of the flue gases were taken with a pyrometer registering to 1,500° F., made by Schaffer and Budenberg. The stem of the pyrometer was inserted into the stacks about 5 feet above the tops of the benches.

Table 1 (see page 804) gives the analyses and calorific values of the various fuels we used in these tests, as far as we were able to determine them. The calorific value by test was determined with a Carpenter calorimeter. The given result is the mean of 6 observations. The computed calorific value was obtained by means of Dulong's formula:

$$h = 14{,}500\,C + 62{,}100\,(H - \frac{O}{8})$$

The result is given in British thermal units per pound of fuel

Our first work was to accurately determine our results, using hot coke in the furnace. The coal carbonized was carefully weighed, and also the hot coke charged into the furnace. We thereupon tested cold coke, Sopris gas coal, Simpson and Pike's Peak lignite, with the results as shown in Table 2 (see page 804). With hot or cold coke the benches would, of course, run along nicely, but we had trouble with the Sopris coal, and the lignites, when used alone. The Sopris coal caked badly, and it was necessary to poke down the fire at frequent intervals. The flues also became badly sooted, which made it hard to keep the heats.

The behavior of the lignites was entirely different from the gas coal. If these were charged into the furnace in large masses, a portion of

their volatile constituents was driven off in a short time, and a flame several feet high shot out of the stack, thus losing valuable heat. It was, therefore, found necessary to charge small quantities at frequent intervals, and we finally found that the best way under the circumstances was to have a man constantly making the rounds of the furnaces. This brought him to one bench about every half hour, at which time a light charge of lignite was thrown in. It would seem as though a mechanical device such as a screw feed could be employed to advantage to constantly charge the lignite into the furnaces.

We found, however, that in spite of all endeavors we could not hold the heats where they belonged. Varying quantities of unburnt coal came through the grate bars, showing that we could not get air to all parts of the fire. Neither the Simpson nor the Pike's Peak coal formed clinkers, but when cleaning the fire our men had to use extreme care or the whole fire would come down into the ash pan. On account of the trouble in maintaining the heats we finally resorted to mixing a certain proportion of hot coke with the lignite. The mixtures that gave the most satisfactory results are as shown in Table 4 (see p. 804). The coke had the effect of holding up the fuel bed so that it was easy to clean the fire, and at the same time rendered it, so-to-speak, more porous so that air could get to all parts of it.

An analysis of the flue gas, using the mixture of Simpson lignite and coke, is as follows: CO_2, 16.5 per cent.; O, 5.0 per cent.; CO, 0.4 per cent.; N, by difference, 78.1 per cent. We were unable to obtain a higher percentage of CO_2, probably owing to the hydrogen of the coal.

In order to make an approximate comparison of the results obtained by using hot and cold coke with the quantities theoretically necessary we used the following data:

Specific heat of coke, assumed = 0.20.

Calorific value of coke, assumed = 9,350 B. T. U. per pound.

The temperature of fire is assumed equal to 2,640° F., or practically the flame temperature of C burning to CO in air. Then the actual heat lost per bench per day of 24 hours when charging cold coke compared to hot coke is:

$$(2{,}240 - 2{,}100 = 140)\ 9{,}350 = 1{,}309{,}000 \text{ B. T. U.}$$

Also the heat required to raise 2,240 pounds of cold coke from 60° F. to 2,640° F. is

$$2{,}240 \times 2{,}580 \times 0.2 = 1{,}155{,}840 \text{ B. T. U.},$$

a result agreeing fairly well with that obtained in practice. This is, of course, only an approximate computation, since the heat required to raise the hot coke as it is drawn from the retorts to 2,640° F., and also the flue gas results, are not taken into consideration.

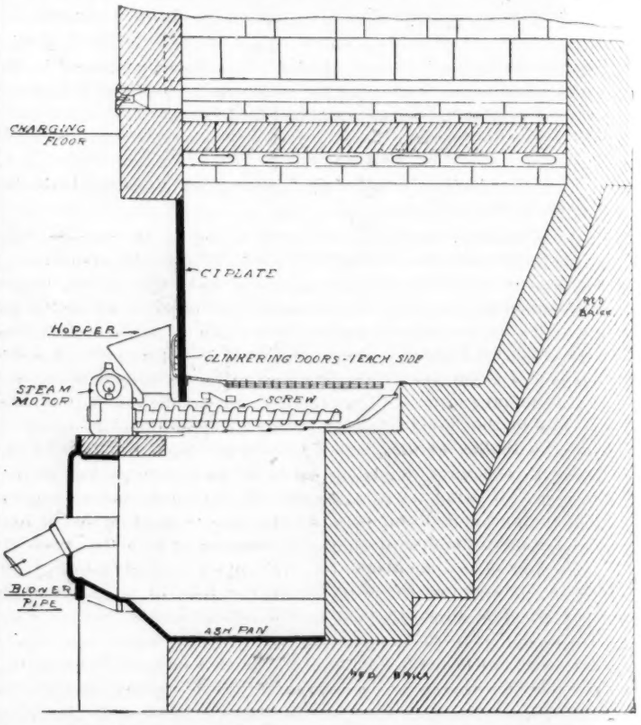
In commenting on our flue gas analyses it must not be supposed that the results shown in these tables were reached at the first trial or first few trials, but it was only after many days of experimenting, changing dampers and primary and secondary air inlets, that we were able to produce uniform and fairly good results. Incidentally it may be well to mention that we effected a considerable saving in the amount of bench fuel used, and since the only true way to determine the efficiency of a bench is by flue gas analysis, it would probably pay most gas companies to install the inexpensive apparatus required and run their benches by analysis of waste gases rather than by the rule of the average retort house foreman, who has heard, sometime or other, that more secondary air is required than primary. He, therefore, opens his secondary air inlet more than the primary by from 25 per cent. to 50 per cent., never thinking that, since the secondary air encounters less resistance in its passage than the primary through the fuel, its velocity is greater, and, therefore, the opening can be proportionately reduced.

If any one is interested in the proper proportion of primary and secondary air they will find a very thorough discussion of this, in a paper[1] by Mr Fred Bredel, read before the Ohio Gas Light Association in 1892, entitled, "The Determination and Regulation of the Proper Proportions of Primary and Secondary Air and Steam in Regenerative Furnaces."

In order to compare our flue gas analyses with those obtained elsewhere, we referred to another excellent paper[2] by the same gentleman, read before the Western Gas Association in 1892, entitled, "The Advantages of Recuperative Furnaces in the Utilization of Heat." We found that the percentages of oxygen therein stated were lower than those we obtained, although our analyses balance very well. We attribute this in a large measure to the fact that the stacks in our works are somewhat cracked, thus allowing air to leak into them.

Since our observations were all volumetric it was necessary to reduce the quantities of constituent gases to per cent. by weight. In reducing we used the specific gravities of each constituent, as given in "Newbigging's Handbook," page 343, 6th edition.

Mechanical Stoker.—During October we placed a 6-inch American, underfeed stoker in the furnace of one of our benches. The width of the furnace was not altered, and the only change was some filling in the rear of the wall which supported the back end of the stoker. After running for some time it was found that the heavy cast iron plate in front and above the stoker became overheated, and we placed a lining of firebrick back of it. The other parts are as shown in the drawing. The



blast pipe was 6 inches diameter, galvanized iron, leading from a No. 1 Sturtevant Monogram blower, belted to a 2-horse power Paragon electric motor, regulated by a speed controller.

This stoker had no cast iron air chamber attached below, but the blast was directed into the furnace underneath, and passed up through nostrils on the sides of the stoker as shown, and also through grate bars, of which there were several on each side of the stoker, to fill the spaces between it and the furnace walls.

We started the fire with hot coke and then began to charge clean, screened pea coke, running the stoker as fast as it would go at 100 pounds boiler pressure. The blower was started at 1,460 revolutions per minute, giving a blast pressure of .9 inches of water at the blower. After several days running we were able to get only a dark red heat in part of the middle retorts. During this time both the primary and secondary air slides were closed.

We thereupon increased the blower speed to 1,930 revolutions per minute, resulting in a blast pressure of 1.2 inches. After about 6 hours we noticed an appreciable increase in the brightness of the color of the middle retorts and the other retorts began to show a dull red. We endeavored to maintain a depth of fire of from 24 to 30 inches on the grate, hoping thereby to promote the formation of CO. It seems probable that the reduction of CO_2 to CO in an incandescent fuel bed is dependent on a time factor, and we hoped to obtain this in the deeper fire.

The following day a bluish flame was seen issuing from the openings in the furnace arch extending as high as the middle retorts. By opening the secondary air slides ½ inch these flames disappeared, and from this time on the heats in the bench began to increase until all the retorts were at a good red heat.

The blower speed was now raised to 3,079 revolutions per minute, and the blast pressure to 2.5 inches. This had the effect of raising the heat to such a point that we felt safe in charging all retorts with slack to close any cracks. While this charge was burning off we increased the speed of the blower to 3,580 revolutions per minute and the blast pressure to 3.2 inches at the blower. The heats increased steadily, but we soon found that the maximum temperature occurred near the front of the bench, or more nearly above the stoker grate, which extended only about half way to the back of the furnace. By blocking up the front

1. See Journal, April 18, 1892, p. 548.
2. See Journal, June 27, 1892, p. 918.

opening from the furnace into the combustion chamber a more even distribution of heat was secured.

It appears from all our work with this type of stoker that if one was constructed to extend all, or nearly all the way to the back wall of the furnace, much better results would be reached. It would be better also to have an air chamber casting, as on the newer types made by the same Company, as this would allow a better regulation of the primary air.

The following morning the heat was sufficient so that we began charging each retort at the rate of 1,200 pounds per day. We then increased the blower speed to the maximum with the pulleys we had, or 3,690 revolutions per minute, and the resulting blast pressure was 3.4 inches.

We now began to mix some Simpson lignite with the pea coke and increased the secondary air opening to ½ inch. The heat increased so that the next day we charged 1,400 pounds of coal per retort per day. The succeeding day we charged 1,600 pounds, and also constantly increased the proportion of lignite fuel. After 24 hours more we were able to carbonize 1,800 pounds of coal per retort per day, and, finally, the day after this we charged 2,000 pounds per retort. At this time we also fired Simpson lignite straight with no pea coke mixed.

We soon found, however, that the high blast pressure was making our bench too hot, especially at the openings from the furnace into the combustion chamber. To reduce this trouble we began to lower our blower speeds, until we finally found that a blast pressure of 2 7 inches, corresponding to a blower speed of 3,246 revolutions per minute, gave satisfactory results.

Table 3 (see page 804) shows one set of analyses, chosen from a large number of such tests, which were taken in the stoker bench at various blast pressures. These are tabulated, not because they show any theoretically good data, but to indicate the difficulties under which we labored to obtain any sort of results with this machine. Samples of flue and furnace gases were always taken at the same time so as to give comparative results.

Table 3 also indicates, first, that the state of the fire influences the formation of CO in the furnace gases. By this is meant that in some cases the fire was deep and extended well up the sides of the furnace, thus allowing no primary air to "by-pass" the fuel bed. This was the case at No. 5 speed. In other instances where the CO is very low, as at the third and fourth speeds, the edge of the fire near the side furnace walls was shallow, and air passed through without the formation of CO. It will be noted that in general when the CO is high the O is low, and vice versa.

Secondly, the percentage of CO_2 in the furnace gases, except in one instance, was fairly large, showing that with this stoker we were unable to maintain conditions favorable to its reduction to CO. In this connection, we will state that we attempted to prove the hypothesis that a certain time factor is necessary to such a reduction, or, in other words, that the formation of CO from CO_2 in a bed of incandescent carbon is a function of the velocity of the gas passing through, but so far we have been unable to do so.

Thirdly, since the percentage of N is found by difference, and is almost always very large, we concluded that this was due to the H of the lignite coal, since we did not endeavor to analyze for this.

Fourthly, the comparison of furnace and flue gas analysis shows that almost always the percentage of CO_2 is less in the flue gas than in its corresponding furnace gas, and the percentage of O greater. We know that the stack was in a very leaky condition, and attribute the poor showing to this in a large measure. That we were unable to maintain conditions so that reliably good data could be secured, shows the difficulty of running a mechanical stoker with the object of causing the formation of CO, and using secondary air to burn it around the retorts.

From Table 3 it will also be seen that at the lower blower speeds less fuel was used. We found, however, that we could not maintain proper heats with less than 3,800 pounds of Simpson lignite per day, and when we fired more than this amount with the increased blast pressure the heat became too great, especially at the furnace arch openings above the fire.

On January 8, 1902, we started a pea coke fire on the stoker grate, having previously let down the bench, and having cut away the sides of the furnace arch openings into the combustion chamber so as to have large holes there. We intended in this trial to run the bench as a free fired bench, endeavoring to burn the fuel directly to CO_2 on the grate.

The primary and secondary air inlets were closed and sealed. From the very first we ran the stoker and the blower at full speeds so as to get up the heats most rapidly.

After the first day we fired Simpson lignite straight, and it took about 3 days to bring the bench to a fair heat. We then began charging coal, but the bench would only carbonize 1,200 pounds per retort per day. We were unable to get full heats, burning as high as 5,000 pounds Simpson lignite in the stoker and carrying the highest blast pressure. During a period of about 2 weeks we were always able to obtain fair flue gas analyses, but the heats would not come up. The lower retorts were hotter than the middle and upper ones, but even these would not carbonize over 1,200 pounds of coal per day.

After 2 weeks' trial we let down the bench. It is only fair to mention that the bench backing against the stoker bench was hot during the whole trial so as to give working conditions. This experiment was a flat failure.

We thereupon tore out the front wall of the furnace of another bench, cut out the furnace arch as much as was safe, and set the stoker so that the grate was almost 6 feet under the lower retorts. We desired to get the stoker as near the retorts as possible, but the construction of our benches and the iron work of the charging floor prevented us from getting nearer than mentioned above. We also thought that the previous failure was partially due to the fact that the fire was so far below the retorts.

In this case also we started in to raise the heats as rapidly as possible, and, as before, 3 days were required to bring the retorts to a medium heat. We ran the blower at full speed and fed in the Simpson lignite coal as fast as the stoker could take it. Upon charging the retorts, however, we found that they would carbonize only 1,400 pounds of coal per 24 hours. After 2 weeks of running, and after trying all the ways we could think of to raise the heats, we finally gave it up.

As before, we burned as much coal as the stoker could push in at full speed, and this quantity was far in excess of what should be required to heat a bench. We think that with a larger stoker, say an 8-inch, fitted with a grate large enough for the furnaces, and with proper blast arrangements, there is no question but that the retorts could be heated properly, but it would seem almost safe to predict that the cost would be prohibitive. Of course, it is well understood that in the direct firing method all the benefits of recuperation are lost, and the sensible heat of the waste gases is carried off.

Table 4 gives the results of our tests regarding the relative costs of the different fuels. It will be remembered that we found that the lignite coals would not work to best advantage alone, and that we mixed some hot coke with them. The best mixtures we could obtain are shown in the first 2 columns of this table. The fourth column shows the loss to us when the hot coke was taken to the pile and quenched, thus turning a certain proportion of it to breeze. Our coke is very friable, and if the entire furnace charge was drawn directly from the retorts there would be practically no breeze formed in it. But if part of the coke which would otherwise be charged into the furnace, is replaced by other fuel, and is taken to the pile and quenched, a certain part of it is converted into breeze. This loss, we estimated from our experience with our coke, and it is shown in column 4. We value our coke at $3.50 per ton in the pile, and breeze at $1 per ton, and therefore have charged out the pounds lost in column 4 at $2.50 per ton, or the difference between the two foregoing figures.

The lignite coal used in the tests was weighed in every day. The steam consumed in the stoker motor at various speeds was obtained by condensing the exhaust steam and weighing the resulting water. The cost of our electric power is based upon our results at the electric plant, when this power is used 24 hours a day, and every day in the year.

Our boiler fuel is Simpson lignite. Its evaporative power, from boiler tests at our works, is 6 pounds of water per pound of coal. Our steam cost is based upon this figure, using as a coal cost $1.80 per ton in the pile, plus 23 cents per ton for the labor to cart it to the boiler room, and 42 cents per ton to fire it, making a total of $2.45 per ton under the boilers. Our other labor charges are figured as follows: The cost of labor to wheel cold coke from pile and fire it into the furnace is 18 cents per ton. The same cost obtains for wheeling Sopris coal from the pile and firing it into the furnaces. The cost of labor and the maintenance of the horse and cart, including feed for the horse, to bring lignite coal from the pile and charge it into the furnaces, is 30 cents per ton. We cannot unload the lignite where our gas coal is unloaded, because the size of the trestle will not permit it.

It does not seem necessary to comment on the results shown in Table 4. They speak for themselves. With a fair market for coke it would pay to burn the gas coal in the benches. We succeeded in using a mixture of Simpson lignite and hot coke at a slight saving over using coke alone.

The following table gives an idea of how certain properties and treatment of fuel may influence the available heat generated by burning it. We take the different amounts of fuel required per bench per day as

shown in Table 4, columns 1 and 2, and multiply each by its calorific value.

Kind.	Weight, Pounds.	Cal. Val.	B.T.U. Calculated.
Cold coke	2,249	9,350	20,944,000
Sopris coal	2,100	11,970	25,137,000
Simpson	1,540	10,000	25,011,000
Coke	1,028	9,350	
Pike's Peak	1,800	6,800	23,460,000
Coke	1,200	9,350	
Stoker.. Simpson	1,800	10,000	34,830,000
Coke	1,800	9,350	
Stoker—Simpson	3,800	10,000	38,000,000

This comparison does not consider the state of the fuel before firing; that is, whether hot or cold. To make an exact comparison, the initial and final temperature and specific heat of each would have to be known. However, it shows that the physical characteristics, such as fineness and method of firing, have a great influence upon the available heat generated.

I wish to acknowledge the help of Messrs. E. P. Gartland and W. M. Siter, of Denver, and Mr. G. W. Parker, of St. Louis, in determining a large part of the data necessary for this paper.

Caring for Consumers' Complaints.

[A Paper read by MR. IRVIN BUTTERWORTH, of Denver, Col., at the Cincinnati Convention of the National Electric Light Association.]

The management of the Denver (Col.) Gas and Electric Company is convinced that no time or money is spent to better advantage in the conduct of a gas or electric lighting business than that devoted to the giving of prompt, thorough and satisfactory attention to all complaints and requests received from consumers. In the case of a quasi-public corporation, popularity is almost synonomous with prosperity, and nothing contributes more to the former than the patient hearing of customers' complaints and requests, and prompt and careful attention thereto. It is said that the Chinese offer sacrifices to the devil because the Lord is already on their side, and on a similar theory an hour spent in trying to satisfy one disgruntled consumer is a much better use of time than devoting it to the entertainment of customers who are already friendly. The manager of a gas or electric light company must also bear in mind the naturally hostile attitude of the average citizen toward quasi-public corporations, and nothing can so quickly establish cordial relations between a company and the community as painstaking and

TABLE I.—*Various Fuels Used in these Tests.*

Kind.	From.	Quality.	Approximate Analysis. Vol. Matter.	Moisture.	Fixed C.	Ash.	S.	Ultimate Analysis. C.	H.	N.	S.	O.	Ash.	Moisture.	B.T.U's. Comp. Cal. Val.	Cal. Val. by Test.	Sp. Gr.
Sopris	Sopris Col	Coking Bitum's.	30.01	0.40	57.50	11.50	0.50	74.54	4.94	0.92	0.59	7.11	11.50	0.40	13,223	11,970	1.314
Simpson	LaFayette, Col	Lignite.	35.19	12.01	46.24	6.56	....	....	....	....	....	....	....	....	....	10,000	....
Pike's Pk.	Colo. Springs, Col.	Lignite.	37.98	11.24	44.72	6.06	....	....	....	....	....	....	....	....	....	6,800	....
Coke	Sopris gas coal	Fair	....	....	79.00	21.00	....	....	....	....	....	....	....	....	11,455	9,350	....

TABLE II.—*Other Fuels in Bench.*

Kind.	Pounds per Furnace per Day.	Pounds per Ton Coal Carbonized.	Temperature of Flue Gas at Stack.	Flue Gas Analysis, per Cent. CO_2.	O.	CO.	N by Diff.	
Hot coke..	2,100	350	880° F.	17.9	5.5	1.0	75.6	Average of 20 analyses.
Cold coke.	2,240	373	880° F.	18.2	5.3	1.3	75.2	" 10 "
Sopris	2,100	350	900° F.	14.4	6.0	0.4	79.2	" 10 " Trouble with soot.
Simpson..	2,900	483	888° F.	14.3	6.5	0.6	78.6	" 10 " Trouble with fire.
Pike's Pk.	3,300	550	900° F.	14.4	5.8	0.4	79.4	" 10 " Trouble with fire.

TABLE III.—*Analysis of Flue Gas from Stoker Bench at Various Speeds of Blower.*

	Motor Speed.	Blower Speed.	Pressure.	Flue Gas Analysis. CO_2.	O.	CO.	N. by Diff.	Temperature F.	Analysis of Gas just above Fire. CO_2.	O.	CO.	N. by Diff.	535 V. Per Hour. Fuel per Bench per Day.	Power Used, Amp.	Steam Used, Pounds.	Fuel.
1	680	2,522	1.8	....	....	....	....	....	....	....	....	....	3,500	1.50	106	Simpson coal no ht.
2	700	2,579	2.0	9.49	8.37	2.22	79.92	840°	11.25	8 01	2.33	78.41	3,550	1.60	107	" "
3	730	2,708	2.2	13.70	5.23	....	81.07	1,020°	13.80	4.36	0.18	81.66	3,600	1.65	108	" "
4	795	2,949	2.3	6.60	15.80	....	77.60	1,030°	12.71	7.00	0.18	80.11	3,650	1.75	108	" Fair ht.
5	830	3,079	2.5	5.23	11.40	....	83.37	990°	6.72	0.88	10.45	81.95	3,725	1.85	109	" "
6	875	3,246	2.7	10.69	7.11	....	82.20	Est. 1,800°	15.03	1.94	2.61	80.42	3,800	1.90	109	" Good "
7	900	3,339	3.0	13.08	2.17	2.85	81.30	Estimate	14.03	2.16	3.09	80.72	3,825	2.00	110	" "
8	965	3,580	3.2	....	....	....	....	....	15.29	3.46	0.13	81.12	3,850	2.05	110	" Too hot
9	985	3,654	3.3	3.86	0.44	8.59	87.11	?	13.20	0.64	3.66	82.50	3,900	2.10	111	" "
10	995	3,691	3.4	6.02	13.23	0.70	80.05	?	11.96	6.24	2.33	79.47	3,900	2.15	111	" "

TABLE IV.—*Comparison of Costs of Bench Fuels per Furnace per Day.*

Fuel.	Bench.	Weight of Coal Used.	Weight of Coke Used.	Cost per T. in Pile.	Loss Due to per cent. Coke turned to Breeze.	Cost Coke Used.	Cost Coal Used.	Extra Labor Firing	Cost Power Electric	Cost Power Steam.	Total Cost.	Remarks.
Hot coke	Recuperator	....	2,100	$3.50	....	$3.68	....	....	....	....	$3.68	....
Cold coke	"	....	2,240	3.50	$0.26	3.92	....	$0.20	....	....	4.38	10 per ct. to breeze at $1 T
Sopris	"	2,100	....	2.85	....	....	$3.00	0.19	....	....	3.19	Trouble with soot.
Simpson & C.	"	1,540	1,028	1.80	0.13	1.80	1.38	0.23	....	....	3.54	Coal cost noted.
Pike Peak & C	"	1,800	1,200	1.60	0.11	2.10	1.44	0.27	....	....	3.92	Coal cost noted.
Simp. & Coke.	Mech. stoker in recuperator	1,800	1,800	....	....	3.15	1.62	0.43	$0.30	$0.53	6.03	Using secondary air.
Simpson	"	3,800	....	1.80	....	....	3.42	0.57	0.30	0.53	4.82	Using secondary air.

[To be Continued.]

courteous treatment of each individual consumer, however unreasonable or however small his consumption. Each consumer, however small or obscure, has a certain influence on a certain element in the community, and to send him forth with a good feeling toward the company and talking well of it among his friends, is surely worth the time and effort required to put him in this frame of mind. There is a wide difference, measured in its effect upon the company's welfare, between the extremes of abuse and praise on the part of even its humblest and most unreasonable customer. The greatest prosperity and the smoothest sailing will be found to lie along the line of best individual treatment of customers, irrespective of the price and quality of the product supplied, and no manager should rest easy so long as he knows there is a single dissatisfied customer on his company's books. The writer recently devoted an hour of his time, together with that of his chief complaint clerk, to satisfying the doubts of one of our most obscure and least influential customers, whose bills did not average $1 per month; and we consider that our time was well spent.

In carrying out in practice the foregoing theory, the Denver Gas and Electric Company has in operation a very complete system for receiving, recording and attending to complaints and requests received from its customers, which we regard as one of the most important "bureaus" of our office. It is in personal charge of what we call our "Order Clerk," whose sole duty it is to receive complaints and requests from customers and have them promptly and satisfactorily attended to. He is designated as "order clerk" rather than *complaint clerk*, and the sign over his window reads "Orders" rather than "*Complaints*," because, while we encourage customers to make their complaints known, we want each one to think that his is the only complaint made. It certainly does not help a company's reputation for careful and accurate work and fair dealing to have it known and advertised that a special department must needs be maintained for taking care of complaints; nor does it lessen the consumer's real or imaginary grievance when he comes to the office to protest, for instance, against the size of his bill and finds that so many others are suffering from the same injustice (?) that the company has found it necessary to establish a separate department with a special corps of clerks for attending to them.

The consumer, therefore, who appears at our office to enter a complaint or request, is politely shown to the "Order Window," which is conspicuously labeled and prominently located. If space would permit, the order clerk would be provided with a separate and closed room in which all complaining customers could be received and seated, and thus be treated with a degree of courtesy and consideration that would of itself have a mollifying effect; while, at the same time, other customers waiting outside or attending to other business at adjacent windows, particularly new applicants for service, would not overhear the making of complaints, accompanied as they sometimes are by tirades against the company.

All complaints received at the office, personally, or by telephone or mail, are referred at once to our order clerk, who enters them in a large book so ruled as to show the reference number of the complaint and date and hour of its receipt, the name and address of complainant, the character of the complaint, the name of the employee sent to remedy it, the time such employee is sent, the time the complaint is reported as remedied and the work done in remedying it. An order is then immediately filled out, corresponding to the entries in the book, and turned over to the shop force for prompt attention. In urgent cases the complaint is telephoned to the shop for immediate attention, followed by a confirming order. When the workman has attended to and remedied the complaint, and while he is still at the premises of the complainant, he fills out the remaining blanks on the order, showing the cause of the trouble, his method of remedying same, the date and his own name, and secures the signature, at the bottom of the order, of the complainant or of a responsible member of his family, certifying that satisfactory attention has been given. The order is then returned to the order clerk, who enters the facts on his record book, above described. He then fills out and mails to the complainant a return postal card, worded as follows:

"On.....1902, you reported .....
Kindly fill out this return postal card stating whether the matter has been attended to to your entire satisfaction. Your prompt reply will be greatly appreciated. Very truly yours,
THE DENVER GAS & ELECTRIC COMPANY."

The reference number is put on each of these cards before sending them out, in order that responses not signed may be identified, and those that are returned are checked off on the record book. Of course, many of the cards are not returned, but many of them are; and most of these report the trouble to have been satisfactorily remedied, many of them expressing thanks and appreciation. Occasionally one comes back with the statement that the trouble still exists or has not been satisfactorily attended to. In such cases a second order is made out and sent to the shop for immediate attention, with proper caution to the workman taking the order. The returned postal card is then attached to the original order, and after the second order comes back, with the notation that the trouble has been remedied, the workman that attended to the original one is called upon by the order clerk to explain his failure to have pr perly remedied the trouble. Occasionally such derelict workman is brought on the manager's carpet and properly disciplined for his remissness. In this way each man knows that his work is under the review of the management, and a high degree of efficiency on the part of the workmen has thus been developed. It is, of course, the duty of the record clerk to see that a report is turned in within a reasonable time on every order that is sent out for attention.

The system of entering in chronological and numerical order the details of each complaint and request, and the attention it receives, enables us, among other things, to refute satisfatorily such statements as, "I telephoned you last month to come out and re-read my meter, but you never did it;" but the best feature of the system is the sending of the return postal card, which almost invariably pleases the customer and creates the desired impression in his mind that the company is, after all, interested in giving him good service and values his patronage.

Manganese Carbide for Gas Making.[1]

Manganese carbide, having the formula Mn_3C, was produced by Troost and Hautefeuille in a small blast furnace, and was later made in the electric furnace by Moissan, who reported its properties fully in 1896. It interacts with hot water, and a mixture of equal volumes of marsh gas and hydrogen are evolved, according to the equation:

$$Mn_3C + 6H_2O = 3\,Mn(OH)_2 + CH_4 + H_2.$$

It therefore differs from calcium carbide, in that it yields no acetylene, but instead a mixture of two gases, which are not formed from the calcium compound. This mixture would evidently serve as an excellent diluent for acetylene, which, in the undiluted state, is too rich in carbon to be readily burnt without smoke or deposit occurring. Hence several workers conceived the idea of mixing the carbides before generation of gas, or of producing a mixed carbide, which on decomposition would yield a mixture of hydrogen, marsh gas, and acetylene in suitable proportions. Some curious and contradictory statements on the production and properties of such a mixed carbide have been made; but on the 5th inst., some more definite and authoritative information was laid before the London Section of the Society of Chemical Industry by Mr. J. S. Brame, in the form of a paper by himself and Professor Vivian B. Lewes on "The Mixed Carbides of Manganese and Calcium."

The authors first described their laboratory attempts at the production of a mixed carbide of manganese and calcium. The proportions of lime, manganese dioxide, and coke were varied as shown in the following table, which gives also the proportion of the gases which would result from the decomposition of the mixed carbide, which, according to theory, might be produced, and the proportions found from the actual product.

Parts of each Constituent in the Mixture used in the Electric Furnace.			Volumes Per Cent of Constituents of Gas.			
			According to Theory.		Actually Found.	
Manganese Dioxide.	Lime.	Coke.	Marsh Gas and Hydrogen.	Acetylene.	Marsh Gas and Hydrogen.	Acetylene
2.5	1.0	1.5	51.63	48.37	44.08	55.92
5.0	1.0	2.5	68.16	31.84	84.20	15.80
7.5	1.0	3.	76.25	23.75	89.75	10.25

These results indicated that when the quantity of manganese in the mixture used was relatively small, the mixed carbide produced contained more calcium carbide than would be expected; while when the manganese was in relatively large proportion, there was more manganese carbide formed than would be required by theory. The results, however, became modified when working trials were made in the ordinary carbide furnaces at Foyers by the representatives of the Acetylene Illuminating Company.

When the proportion of manganese dioxide to lime was low, only calcium carbide was produced; but when the manganese dioxide was

1. *Journal of Gas Lighting.*

in considerable excess, only manganese carbide was obtained. Thus under neither of these conditions was a mixed carbide formed. But it should be added that intermediate mixtures of the raw materials have not been tried on the large scale. The current employed was 1,000 ampères, at 58 volts; the carbon electrodes being 6 inches square. There appeared to be little gain in efficiency unless the manganese was in large excess, when the yield per kilowatt hour was appreciably greater, as the following statement of the yield of the pure carbides would indicate to be probable:

	Current Used.			Kilowatt Hours.	Pounds of Ingot per Kilowatt Hour.
	Volts.	Amperes.	Kilowatts.		
Calcium carbide.....	57.0	870	49.6	188.5	0.34
Manganese carbide...	58.5	900	52.7	30.7	0.84

The manganese carbide made at Foyers is a metallic like substance, with golden yellow to whitish fracture. It is quite stable in the air, and is very slightly, if at all, decomposed by cold water; but it is decomposed fairly rapidly by water at 160° F. and upwards, yielding equal volumes of hydrogen and marsh gas. After making deduction of a little matter, which, as in the case of commercial calcium carbide, remains unacted upon, the yield of gas corresponds to about 98 per cent. of true manganese carbide; the remaining material being chiefly manganese silicide. Manganese carbide should theoretically yield 4 02 cubic feet of gas per pound; while a pound of calcium carbide should similarly yield 5.59 cubic feet of acetylene. The fusing point of the manganese carbide is lower, which is an advantage from the manufacturing standpoint. The heat required for its production is theoretically 146,520 calories, against 197,200 calories for calcium carbide. It has a much higher density—viz., 6.89—whereas the density of calcium carbide is only 2.22. This difference may to some extent be responsible for the difficulty of obtaining the mixed carbides on a large scale. As matters stand at present, there seems to be no advantage in mixing manganese dioxide with lime for carbide manufacture, since the resultant carbide appears to be one of either metal, according to the proportions used, but never a mixed carbide. It is likely, however, that there may be a limited scope for the employment of manganese carbide for generating gas for the dilution of acetylene, as the generation could take place along with that of the acetylene.

There was no discussion of the paper at the meeting.

Heavy Hydrocarbons in Lighting Gas.

The *Gas World* notes that Dr. P. Fritzsche, Leipzig, had a paper in the *Journal fur Gasbeleuchtung* on the above subject. He says that with the advent of Welsbach burners and the extended use of gas for heating the heavy hydrocarbons in gas are losing their importance as illuminants, and that considering their utility as now becoming restricted to their heating value their cost is coming to bear no relation to their value. Still, although the tendency now is to turn towards water gas, carburetting this if necessary, there may yet be circumstances under which it might be more advantageous to make coal gas and then to find a more profitable use for the heavy hydrocarbons by extracting these from the whole or a part of the gas made. In the meantime, it certainly pays in Germany to do this with benzol; and it is worth investigation whether it might not be worth while to do the same with ethylene and other hydrocarbons. Ethylene can be absorbed by strong sulphuric acid, though not in great quantities, and from the ethyl-sulphuric acid formed ether or alcohol can be prepared. The difficulties arise not so much from the slowness of the absorption as from the presence of other hydrocarbons which form condensation products and dissolve in the sulphuric acid.

A Wide Range.—Till recently attention was confined to benzol, acetylene and ethylene, and to their various homologues within the aromatic and the fatty series. But recent work has shown that we must considerably widen our view, and that we must assume that in coal gas we have, in smaller or larger proportion, every possible compound of carbon, hydrogen, oxygen, sulphur and nitrogen, which can exist as vapor at ordinary temperatures. In what proportions they are produced depends upon the original materials and upon the conditions of the gas-making; but we find that sulphuric acid, which absorbs very little benzol or ethylene, will take up—either simply in solution or as polymerized compounds or as sulphonic acids—from 2.18 to 6.55 grains per cubic foot of other hydrocarbons; which corresponds to from ½ to ¾ per cent. by volume of the gas. From oil gas, similarly, the amount absorbed is 43.7 grains per cubic foot.

Unreliability of Ordinary Ethylene Tests.—Under these conditions it is not possible to ascertain the amount of ethylene in gas by finding the difference between the whole hydrocarbons and the benzol and setting this difference down as ethylene, or by ascertaining the amount of bromine taken up by the gas. The methods based on either of these principles serve excellently so long as we have to do only with the heating value of the gas, or so long as we have to do with pure mixtures of benzol and ethylene, which we very rarely find. To find the exact quantity of ethylene we must transform it into the corresponding quantity of alcohol; and this method seems to give very good results, but it remains to be ascertained whether the presence of the other hydrocarbons has any effect on the reactions. In coke oven gases, approximately free from benzol, this direct estimation of the ethylene gives results from 0.3 to 0.6 per cent. on the volume of the gas less than those obtained by the ordinary methods, the difference being probably due to the other hydrocarbons. Among these we have to include the higher homologues of ethylene, from butylene onwards, since these have a strong tendency to become polymerized by strong sulphuric acid, and some of them are only converted into ether-sulphates by somewhat diluted sulphuric acid. The alcohol obtained through the absorption of ethylene from coal gas or oil gas therefore contains only very small proportions of such alcohols as have a higher boiling point than ethyl alcohol; and even propyl or isopropyl alcohol is present only in traces. There is very little reaction, if any, between the ethyl-sulphuric acid and the condensation products from the other hydrocarbons; but the acid has to be used in considerable excess and the process absorbs time and patience. It can, however, be much shortened by distilling the charged sulphuric acid continuously in a column apparatus. The acid may amount to 100 to 150 cub. cm. shaken up with the gas in a 2 to 4 liter flask for two hours by mechanical means.

Collection of the Other Hydrocarbons.—It seems clear that the condensate absorbed by sulphuric acid from coal gas or oil gas contains quite an array of interesting products. If the gas be washed first with dilute and then with strong sulphuric acid we may expect to recover many hitherto unrecognized, such as terpenes, which are extremely probably present. If the gas be washed with strong sulphuric acid and then a little water is added the liquid becomes milky and a layer forms on the surface which is only soluble in pure water, forming a green solution which probably contains a series of sulphonates. There is much work to be done in the investigation of these products.

Advantages of Gas Engines for Central Station Work.

At the Cincinnati meeting of the National Electric Light Association, a paper was read on the topic named in the heading by Mr. Charles H. Williams. The author detailed an account of the results of operating a gas engine electric generating plant at Madison, Wis., supplemented by data gathered from other gas engine stations. Tests made of the steam generating plant in ths Madison station showed that the efficiency of energy transformation is 6.6 per cent. under favorable average working conditions. It is stated that while this efficiency may appear low to a great many central station men, it probably represents much better than the average conditions; and that the large majority of the smaller stations in operation throughout the country will not transform more than from 2.5 per cent. to 4 per cent. of the energy of the coal into dynamic energy. In the case of the Madison gas engine plant, 20.8 per cent. of the original number of heat units contained in the pound of coal that was put into the gas generator was utilized, or 3,016 heat units for useful work per pound of coal, against 1,008 per pound with steam. Mr. Williams discusses in his paper a number of points connected with the operation of gas engines, and gives data as to the thermal value of different kinds of gas. Data are also given as to the operation of gas engine central station plants located at Mankato, Minn., and Oshkosh, Wis.

At Mankato there are installed one 85-horse power and one 125-horse power gas engine, and recently there have been added two additional 50 horse power engines. These furnish power for 107 32 candle power lamps, 63 2,000-candle power open arcs, 35 commercial multiple arcs and 1,800 16-candle power incandescent lamps, together with a motor load of 60-horse power. The books of the Mankato company show that the amonnt of gas used for the six months ending January, 1902, was about 78 per cent. increase over the previous gas output, and that this increase lowered the cost of the gas to the company 8 cents per 1,000; this was exactly the same as giving them an additional profit of 8 cents per 1,000 on every thousand sent out to its regular customers. Mr. Williams considers that it is perfectly legitimate for that company to credit the gas engine account with 8 cents per 1,000 on 16,000,000 cubic feet of gas, that being its actual output, or $1,280 per annum; and

this credit amounts to 18 per cent. of the total amount which it had paid for power previously.

At the Oshkosh plant there were installed two 50-horse power and two 125-horse power gas engines, and the output is 45,000,000 cubic feet of gas per year. The extra output here lowered the cost of gas in the holder 8 cents per 1,000, so that the gas engine should be credited with $3,600 per year due to decreased cost in gas generation.

There are also installed two gas engines at Red Wing, Minn., two at La Crosse, Wis., and three at Appleton, Wis., all running on illuminating gas. The Bradford, Pa., central station has three 150-horse power and one 210-horse power gas engines, which have been in operation for three years, and that company is just installing an additional 210-horse power engine. The manager of the plant, Mr. J. H. Rose, speaks highly of this installation. Formerly steam engines were used, the boilers being fired with gas. The last days of the steam plant showed a consumption of 51.09 cubic feet of gas per 1-horse power, while with the gas engine the consumption is but 13.6 cubic feet per electrical horse power, which reduced to indicated horse power would be equivalent to between 11 and 12 cubic feet. The gas engine repairs for the year 1901 amounted to $196.90, including extra exhaust valves for all the engines.

Several gas engine plants for furnishing power to manufacturing establishments were referred to. In conclusion Mr. Williams says that so far as reliability of operation is concerned, he believes the earlier manufacturers are more to blame that anyone else for what trouble was experienced, too many units having been sold with the assurance that anyone could run them. The same advice carried out at a steam station would put it on a losing basis. There are a very few small details which demand intelligent and regular attendance of the gas engine, and if these proper conditions are maintained the engine will operate satisfactorily, and the attendance troubles are over.

An Unusual Injury to a Water Power.[1]

The plaintiffs are the owners of about 23 acres of land on the Little Schuylkill River, in Schuylkill county, Pa., on which is a water power flour mill, with the usual dam and races. The defendant is the owner and operator of coal mines situate on and near Panther Creek, a stream tributary to the Little Schuylkill River, above the lands of the plaintiffs. In the operation of its mines the defendant has placed culm banks along and near Panther Creek, and has allowed its mine water and the wash water from its breakers and washeries to reach Panther Creek more or less charged with coal dirt. The coal dirt in this water, and that which has been eroded from the culm banks by rains, and to some extent by the action of the stream on their cases, has been carried down to the plaintiffs' dam and deposited there, filling the same and impairing the plaintiffs' water power. It is of this injury only, to their water power, by the accumulation of coal dirt in their dam, and also in the race, that the plaintiffs complain.

Their flour mill is equipped with steam power in addition to the water power, for the reason that at certain seasons of the year the water in the stream is too low to furnish power. This bill in equity was filed against the defendant company, praying that it be enjoined and restrained from discharging into the Little Schuylkill River or its tributaries the coal dirt, refuse or polluted waters from its breakers, mines or washeries, and from washing or placing any such dirt, culm or refuse where it might be washed or escape into the said river or its tributaries. The court below found that the injury to the plaintiffs was not permanent, and that the dam and race can be cleared of coal dirt at a cost very much less than the value of the water power. But, while this is true, yet the very nature of the operation showed that, as heretofore conducted, there was practically a continuous interference with the proper use of the water power by means of an undue loading of the stream with dirt or culm. Accordingly, a perpetual injunction was granted to restrain the defendant from polluting the waters of Panther Creek in the manner described in the bill and as set forth in great detail in the testimony. In addition to this, the learned court, in his decree, assessed the damages sustained by the plaintiffs at the sum of $4,900.

The testimony in this case is voluminous, but we have examined it very carefully. We are satisfied that the case is one in which it is proper for a court of equity to interpose for the purpose of restraining a continuous trespass. It is not to be doubted that an injunction is the appropriate remedy for the prevention of trespasses and nuisances which, by reason of the persistency with which they are repeated, threaten to become of a permanent nature. Ample authority may be found to sustain this proposition in the line of cases culminating in Fricke v. Quinn, 41 Atl., 737; Walters v. McElroy, 25 Atl., 125. In so far, therefore, as the decree restrains the defendant from polluting the waters of Panther Creek, it may be sustained. It has become the established course of procedure in Pennsylvania, where a bill for the purpose of injunction is sustained, to connect with it the account, without compelling the plaintiff to go into a court of law for damages. When, therefore, as in this case, the plaintiffs' right to an injunction is established, an account of the damages sustained follows as an incident, and to avoid a multiplicity of suits. Walters v. McElroy, 25 Atl., 125.

But in this case the opinion of the court below does not set forth the rule which was adopted in computing the damages, and gives no indication of the manner in which the amount was ascertained. A close study of the testimony fails to disclose any basis of computation which yields the sum awarded. The plaintiffs were entitled to recover as damages: First, the increased cost of running the mill by steam, in so far as it was made necessary by the diminished water power, occasioned by the introduction of culm and dirt by the defendant; second, the cost of cleaning out the culm and dirt from their dam and mill race.

As to the first item—the increased cost of steam during the years for which complaint is made—the testimony seems to show pretty clearly that it amounted to the sum of $1,021.23; but, whatever it may have been, the proper measure of this element of the damages is the actual cost of steam made necessary by the defendant's interference with the water power.

As to the other item, it appears clearly from the testimony that the dam and race can be cleaned out, and that they will then be restored to their original condition. The cost of this cleaning of the dam and race does not definitely appear from the evidence. The amount awarded by the court for this purpose—$900—included not merely the cost of cleaning the dam and the race, but of providing a new arrangement of gateways and sluices, which would not only clear out the premises, but would tend to keep them clear in the future. This is more than the plaintiffs have a right to ask. The injunction will protect them from future interference in so far as the defendant is concerned, so that the item of $900, awarded by the court to cover this particular, is entirely too large, and is not justified by the evidence. The actual cost of clearing out the premises is the proper measure as to this item. Some additional testimony may be required to fix this amount.

It is, therefore, ordered that so much of the decree in this case as awards a perpetual injunction to restrain the defendant from polluting the waters of Panther Creek in the manner set forth in the said bill of complaint be affirmed, and it is further ordered that the record be remitted to the court below for the purpose of restating the account of the damages, in accordance with this opinion, and for the entry of a final decree against the defendant for the payment of the sum so found, together with the costs of suit.

1. *Engineering Record.*

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

We are indebted to a correspondent connected with the Town of Hempstead Gas and Electric Light Company, of Far Rockaway, N. Y., for the following details respecting the present status of that Company: "The Town of Hempstead Gas and Electric Light Company, of Far Rockaway and Rockaway Beach, was purchased last fall from Messrs. Steck and Mealey, of Philadelphia, by Mr. V. Everett Macy and Mr. George Crocker, of New York. The purchasing price was $125,000. This Company has an electrical franchise, but never operated in electricity till recently. The gas output last year was about 25,000,000 cubic feet, but under the management of Mr. F. C. Slade the works have been greatly improved and the mains extended, so that the output has been nearly doubled over last year. A few weeks ago the Company purchased the Queens Borough Electric Light and Power Company, the purchasing price being about $750,000. The two Companies are now combined under one management and represent a total investment of something over $1,000,000. The district covered by the Company is rapidly growing, and includes Rockaway Beach, Arverne, Lawrence, Cedarhurst and Woodmere."

Mr. Charles L. Barrett has been elected Secretary of the San Francisco (Cal.) Gas and Electric Company, succeeding Mr. A. D. Grimwood, who was appointed Secretary *pro tem.* on the retirement of Mr. William G. Barrett, whose advanced age precluded him from further active duties. The present incumbent is a son of Mr. William G. Barrett, and had acted as the Company' Cashier.

The capital stock of the Mattoon (Ills.) Gas Light and Coke Company has been increased from $25,000 to $50,000.

It is said that the Philadelphia capitalists who have been granted the right to construct and operate a gas plant in Hampton, Va., propose to build the works this summer.

Mr. Edgar L. Powers has resigned the place of Manager and Superintendent to the Lincoln (Neb.) Gas and Electric Company. His successor is Mr. C. D. Strong, formerly in charge of the affairs of the Consolidated Gas Company, of Long Branch, N. J.

THE summer residents of Cosey Beach have petitioned the New Haven (Conn.) Gas Company to extend its mains from East Haven green to the Beach.

THE Directors of the Utica (N. Y.) Gas and Electric Company, which corporation has succeeded to the rights and properties of the Equitable Gas and Electric Company and those of the Utica Electric Light and Power Company, have perfected the following executive organization: President, Anthony N. Brady; Vice-President, W. E. Lewis; Secretary, Wm. J. Cahill; Treasurer, George H. Stack. Executive Committee: Jno. F. Maynard, W. E. Lewis and S. A. Beardsley. A. B. Johnson was appointed Manager of the gas division of the Company's trading, and M. J. Brayton will superintend the electrical division.

THE contract for the installation of a coal gas generating plant in the works at Alexandria, Va., which is operated on public account, has been awarded to Messrs. Baxter & Young, of Detroit.

THE proprietors of the Muscatine (Ia.) Electric Railway Company will install a complete, new coal gas plant on the most approved modern lines, erecting new buildings for the housing thereof. The contract for the condensing, scrubbing and purifying apparatus has been awarded to the Lloyd Construction Company, of Detroit, Mich. The agreement calls for a present installation of 250,000 cubic feet capacity *per diem*, and the apparatus is arranged for duplication on the Construction Company's improved system of coal gas plant.

THE East Ohio Gas Company, which supplies natural gas in Akron, O., has notified the residents that the selling rate has been increased to 25 cents per 1,000 cubic feet, an advance of 5 cents.

MR. ARTHUR J. DYER, a valued employee of the New Haven (Conn.) Gas Light Company, was recently granted a leave of absence of 2 months, which time he proposes to spend abroad. He leaves for Liverpool, per the steamer Celtic, the morning of the 6th inst. Prior to his departure he was entertained one evening by several of his fellow workers, and a feature of the proceedings was the presentation to him of a handsome travelling bag.

A FEATURE of the proceedings of the recent Cincinnati meeting of the National Electric Light Association was the welcome tendered the delegates by General Andrew Hickenlooper, President of the Cincinnati Gas and Electric Company. The General spoke as follows:

"Gentlemen of the National Electric Light Association: It affords me pleasure to acknowledge the compliment of being assigned to the agreeable duty of extending, on behalf of our citizens and your resident fellow-craftsmen, a cordial and heartfelt welcome to

"The Queen City of the West, in her garlands dressed,
On the banks of the beautiful river."

"A city which, within her territorial and tributary limits, embraces a population of nearly half a million people; 200,000 of whom are directly engaged in manufacturing enterprises; turning out every year products valued at three hundred million dollars, which find their way, over 20 centering lines of railways, to every section of the habitable globe.

"A city that contains the largest soap works; the biggest tannery; the most extensive lithographing establishment; the greatest shoe industries, and a larger number of carriage factories than any other city in the world. And last, but by no means least, one of the best equipped and most efficiently managed electric manufacturing plants in this country; which, based upon its past history and phenomenal growth, gives promise in the near future of taking its place in the front rank of the great electrical industries of our country. From the mere nucleus of a plant, employing but 20 men, in 1896, it has in this brief period of half a dozen years grown to the dimensions you will be afforded an opportunity of inspecting; briefly stated, having ultimately a producing capacity of 10,000 K. W. machines and employment of 800 men. Many of the swiftly revolving presses that reflect the intelligence of the old and new world, as well as the railways of Siberia, the mines of Tasmania, the gold fields of Alaska, the great ocean liners and the stately battleships of our nation are to-day responding to the energy of Bullock dynamos, several of which, having a capacity of 3,200 K. W., are now in process of construction upon orders from the Company I have the honor to represent; thus presenting an impressive illustration of the possibilities of well-applied energy and business ability, accomplishing results profitable to its projectors and creditable to the industry they represent. Not only do we thus point with pride to our various manufacturing enterprises, but take equal pleasure in calling your attention to the beauties of our suburban residence districts; incomparable Zoo Gardens; to our Music Hall; Art Museum; Rookwood Pottery; Cincinnati University; our High School buildings, and other notable structures, the erection of which was made possible by the munificent bequests of McMicken, Springer, West, Woodward, Hughes, Cunningham and other enterprising and public-spirited citizens, who, by such commendable acts, have endeared their names to every inhabitant of our city.

"To you, gentlemen, who have honored us with your presence, it is unnecessary to say more than to briefly refer to the pleasure we feel in extending this welcome to men who have by their energy, genius and scientific attainments rivaled the accomplishments of Aladdin with whose phenomenal success in the lamp business it is presumed you are all still more or less familiar. But in order that you may not claim an exclusive patent on his business methods, or arrogate to yourselves all the credit for success in changing new lamps for old ones, I desire to call your special attention to the fact that even in his case it became necessary to enlist the services of two promoting agencies—the Genius of the Lamp, which you may properly represent, and the Genius of the Ring, a term not infrequently locally applied to gentlemen like myself, who have rendered material assistance in promoting the introduction and utilization of the appliances which your genius has created.

"It has been said of the immortal Lincoln that for a time he forged the thoughts that governed the world. You, gentlemen, have not only forged the thoughts, but have molded into practical shape the crude ideas of others, which have made possible their application to industrial pursuits and business enterprises that have enriched the world and added materially to the comforts and happiness of mankind. It is not my purpose to weary you with words of fulsome praise, but only to, as briefly as possible, voice the sentiments of all thinking people who recognize the fact that you have established for yourselves reputations for ability, energy, integrity and that type of manhood which mark each and every member of your association as distinctive characters of an age which, in scientific accomplishments, stands unparalleled in the world's history. We sincerely hope that this—your twenty-fifth meeting—may prove no less enjoyable and professionally profitable than those which have preceded it; and when you have finally exchanged all your new lamps and ideas for our old ones, and leave for your distant fields of labor, we trust that each and everyone may carry with them nought but pleasant memories of your only too brief visit to our city."

THE Kingston (N. Y.) Gas and Electric Company was recently incorporated, with a capital of $700,000. Its object is to furnish gas and electricity to Kingston and all the towns of Ulster county. It is merely an amplification of the Gas Company that heretofore operated in Kingston, and is under the control of the American Gas Company, of Philadelphia. Its Directors are: Morris W. Stroud, R. L. Babcock, Franklin J. Tobey, Eugene W. Prout and J. P. Osterhoudt.

AT the annual meeting of the Portland (Me.) Gas Light Company the officers chosen were: Directors, E. H. Daveis, Wm. H. Moulton, F. N. Dow, Elias Thomas, C. S. Fobes and Wm. B. Johnson; President, E. H. Daveis; Vice-President, Wm. H. Moulton; Treasurer and Clerk, Burton Smart.

THE Citizens Light, Heat and Power Company, an opposition concern that proposes to supply gas and electricity to the residents of Utica, N. Y., has been incorporated by Messrs. J. Edward Addicks, E. O'Shea and Ed. H. Wilson.

THE officers of the Red Wing (Minn.) Gas and Electric Company have filed with the Secretary of State an amendment to its articles of incorporation, by the terms of which its corporate existence is extended for 30 years.

MR. FREDERICK COOK has resigned the position of President of the Rochester (N. Y.) Gas and Electric Company. Mr. George W. Archer, Treasurer of the Company, was chosen to succeed Mr. Cook. Mr. Wray L. Cole, the present Secretary and Assistant Treasurer, was elected Treasurer; he also retains the position of General Manager of the gas department of the Company's business. Mr. Junius R. Judson was elected Secretary and Assistant Treasurer.

MR. SAMUEL M. ROBINSON, for many years President of the Consolidated Gas Company, of Pittsburg, Pa., died in that city, the evening of May 20th. Deceased was in his 69th year, having been born in North East, Erie county, Pa., June 25th, 1833.

THE San Francisco Gas and Electric Company has reduced its selling rate in the district known as the Mission to 50 cents per 1,000 cubic feet. The conditions of the trade in San Francisco are simply chaotic, but the losing game cannot go on much longer.

MR. J. S. BROWN has brought suit against the proprietors of the Galion (O.) Gas Light Company to restrain them from increasing its capital stock from $70,000 to $200,000. As a shareholder in the concern he declares that the majority in interest have bankrupted the plant, and he asks that a detailed accounting be made.

THE St. Paul (Minn.) *Dispatch* is our authority for the statement that the earnings of the St. Paul Gas Light Company for the first 3 months of the year exceed those of the corresponding period of 1901 in the sum of 63 per cent.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
MANAGER.

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OHIO GAS LIGHT ASSOCIATION.
PACIFIC COAST GAS ASSOCIATION

Notification Respecting Advertising.—Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co. 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, JUNE 2, 1902.

The Market for Gas Securities.

Nothing of importance occurred in the market for local gas shares last week. There was some trading in Consolidated, which was accomplished in the main at higher prices than those reported for the previous week. The closing to-day (Thursday) was made at 221½ to 222, ex dividend of 2 per cent. So far as the local lighting situation is concerned good business is beyond doubt the feature.

Quite some activity in Brooklyn Union was reported, the recorded transfers aggregating over 1,200 shares, and prices in it were stoutly maintained. The closing to-day was 235 to 237. Buffalo gas moved up to 15, on fairly large sales, but there seems to be no good reason for the advance, nor was the latter effective as far as the Company's 5's are concerned. Peoples, of Chicago, is steady. Consolidated, of Baltimore, shows no change. Bay State is still traded in at 2. Washington gas is slowly recovering from the sharp break caused by the unexpected check to the proposed legislation permitting the refinancing of the Company. We have no doubt, however, that in time it will sell at higher figures than those made by it a month ago.

Cincinnati Gas and Electric is strong at 103½ to 103¾, which is a pretty good rating for a 4 per cent. stock. Still it is not a close secret that the Company is earning considerably more than the dividend rate would indicate. Columbus (O.) gas, first 5's, are 107½ bid.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

JUNE 2.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	221½	222
Central Union, Bonds, 5's	3,000,000	1,000	109	110
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	350	..
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co. ..				
Bonds, 5's	11,000,000	1,000	111½	..
Northern Union, Bonds, 5's.	1,250,000	1,000	106	108
New York and East River..				
Bonds 1st 5's	3,500,000	1,000	112	113
" 1st Con. 5's	1,500,000	..	109	111
Richmond Co., S. I.	348,650	50	100	..
" Bonds	100,000	1,000	103	..
Standard	5,000,000	100	130	140
Preferred	5,000,000	100	150	160
Bonds, 1st Mortgage, 5's	1,500,000	1,000	114	117
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	235	239
" " Bonds (5's)	15 000,000	1,000	119	119½
Bay State	50,000,000	50	2⅛	2¼
" Income Bonds	2,000,000	1,000	.	75
Binghamton Gas Works..	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	14⅞	15
" " Bonds, 5's	5,250,000	1,000	83½	84½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000		
Central San Francisco	2,000,000	..	100	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co..	29,500,000	100	103½	103¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	108	109
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89¼
Preferred	3,026,500	100	106¼	107¾
Consumers, Jersey City Bonds	600,000	1,000	102	103
Consumers, Toronto	1,700,000	50	218	225
Consolidated, Baltimore	11,000,000	100	67¾	68
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	.	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	380,000	1,000	82	83
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	.	89
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	382,000	1,000	70	73
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	34	38
Fort Wayne	2,000,000	..	.	.
" Bonds	2,000,000	..	58	63
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	75	80
" Bonds, 6's	2 650,000	..	104¾	107
Jackson Gas Co	250,000	50	73	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	86	89
Preferred	2,500,000	100	106	110
Bonds	10,000,000	1,000	109½	110
Lafayette Gas Co., Ind.	1,000,000	100		60
Bonds	1,000,000	1,000	58	64
Louisville	2,570,000	50	110	120
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	107½	1 [illegible]
" 6 per cent. scrip, due 1910	100,000	25	25	87
Montreal, Canada	2,000,000	100	182	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	..	55
Bonds, 6's	4,600,000	..	..	103
New Haven	1,000,000	25	320	325
Nashville Gas Lt. Co.	1,000,000	100	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	101¾	102
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	48	48½
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's..	2,465,000	1,000	92	93
St. Joseph Gas Co.				
" 1st Mtg. 5's	751,000	1,000	95	96½
Syracuse, N. Y.	1,750,000	100	15	17
Bonds	1,612,000	1,000	95½	97½
Washington, D. C	2,600,000	20	325	341¼
First mortgage 6's	600,000	..	..	..
Western, Milwaukee.				
Bonds, 5's	4,000,000	..	109½	110
Wilmington, Del	600,000	50	232	..

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Two Sections of Hydraulic Main, Wrought Iron; Stiness Pattern Patent Tar Take-off; Bridge and Standpipes, and Mouthpieces, with Self-sealing Lids for 7 Benches of 6's.
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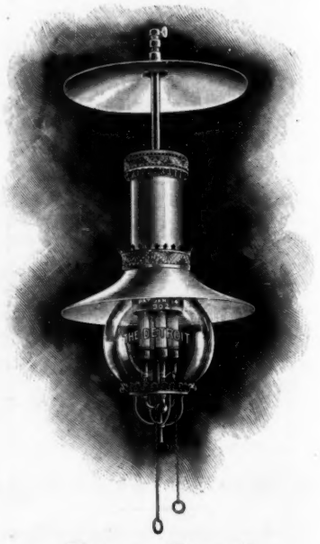

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Always in Order.

Our lamp gives 25 per cent. ***more light*** with 20 cent. ***less gas*** than any Arc Gas Lamp now on the market.

TO LIGHT CONSUMPTION WHAT THE GAS RANGE IS TO FUEL. : : : : :

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DETROIT, MICH.

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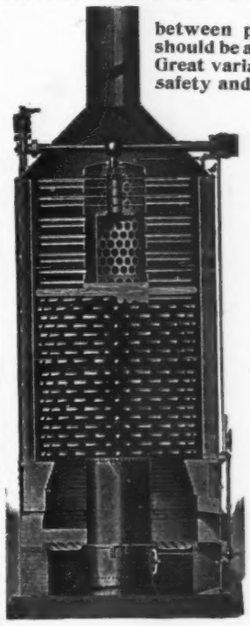

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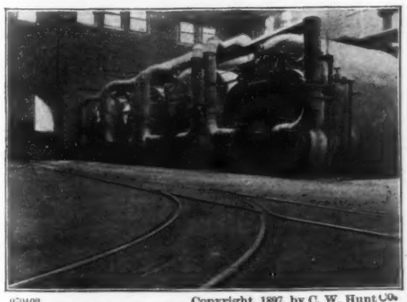

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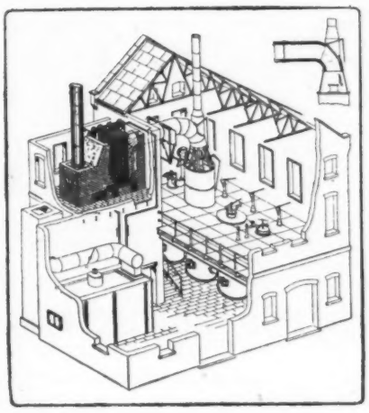

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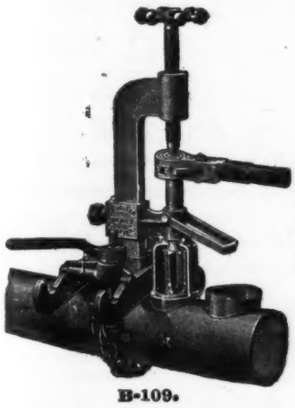

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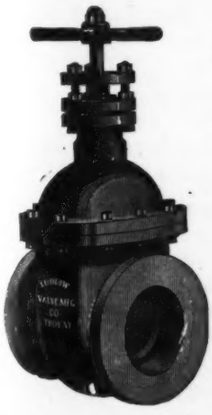

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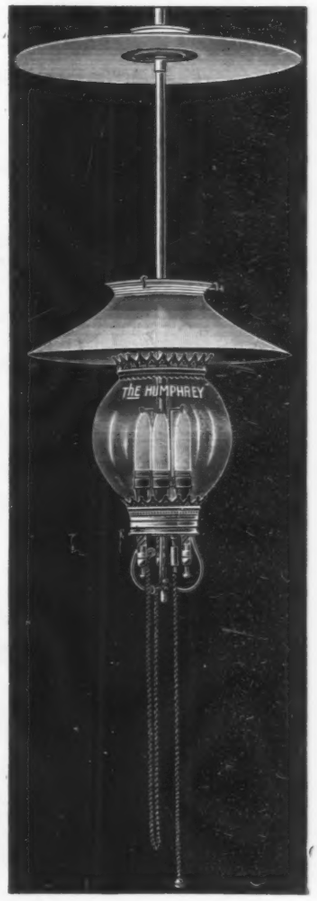

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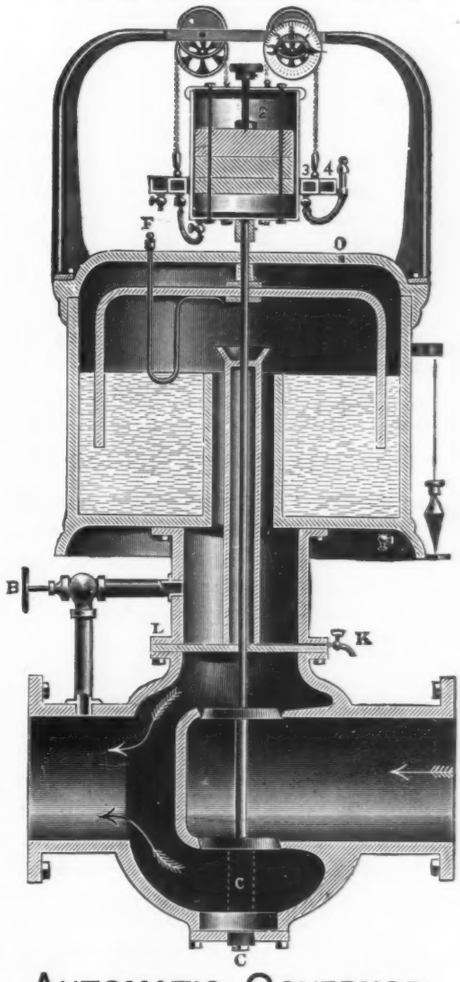

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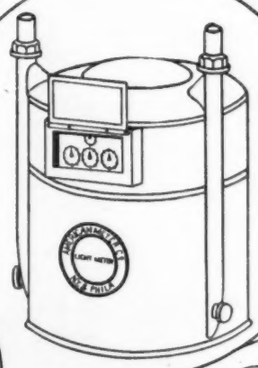

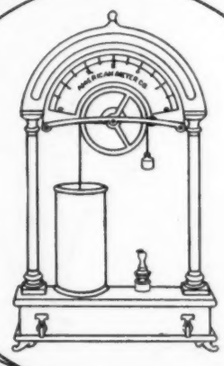

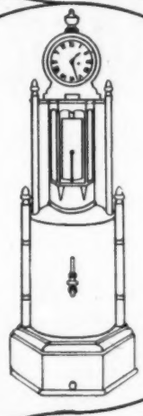

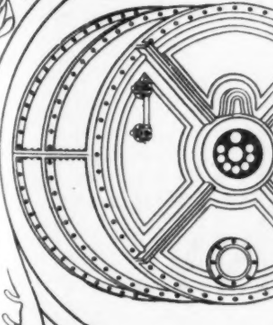

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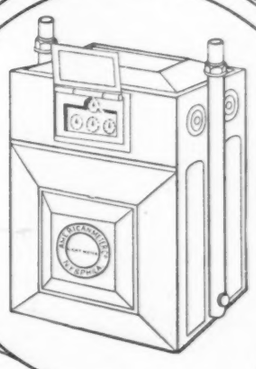
PUBLIC LIGHTING TABLE.

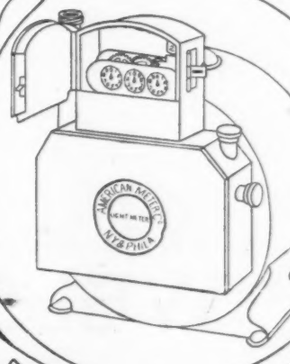
JUNE, 1902.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extingnish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Sun.	1	7.50 PM	2.50 AM	7.15	3.15
Mon.	2	7.50	3.30	7.15	3.15
Tue.	3	7.50	3.30	7.15	3.15
Wed.	4	7.50	3.30	7.25	3.15
Thu.	5	7.50 NM	3.30	7.25	3.15
Fri.	6	7.50	3.30	7.25	3.15
Sat.	7	7.50	3.30	7.25	3.15
Sun.	8	8.00	3.30	7.25	3.15
Mon.	9	8.00	3.30	7.25	3.15
Tue.	10	10.00	3.30	7.25	3.15
Wed.	11	10.40	3.30	7.25	3.15
Thu.	12	11.10 FQ	3.30	7.25	3.15
Fri.	13	11.40	3.30	7.25	3.15
Sat.	14	12.10 AM	3.30	7.25	3.15
Sun.	15	12.40	3.30	7.25	3.15
Mon.	16	1.20	3.30	7.25	3.15
Tue.	17	1.50	3.30	7.25	3.15
Wed.	18	2.30	3.30	7.30	3.15
Thu.	19	No L.	No L.	7.30	3.15
Fri.	20	No L. FM	No L.	7.30	3.15
Sat.	21	No L.	No L.	7.30	3.15
Sun.	22	8.00 PM	9.30 PM	7.30	3.15
Mon.	23	8.00	10.10	7.30	3.15
Tue.	24	8.00	10.40	7.30	3.15
Wed.	25	8.00	11.10	7.30	3.15
Thu.	26	8.00	11.40	7.30	3.15
Fri.	27	8.00	12.20 AM	7.30	3.15
Sat.	28	8.00 LQ	12.50	7.30	3.15
Sun.	29	8.00	1.20	7.30	3.15
Mon.	30	8.00	2.00	7.30	3.15

TOTAL HOURS LIGHTING DURING 1902.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	238.30	January	423.20
February	196.20	February	355.25
March	196.20	March	355.35
April	166.40	April	298.50
May	151.40	May	264.50
June	131.10	June	234.25
July	142.40	July	243.45
August	162.00	August	280.25
September	179.00	September	321.15
October	216.30	October	374.30
November	224.10	November	401.40
December	250.00	December	433.45
Total, yr.	2255.00	Total, yr.	3987.45





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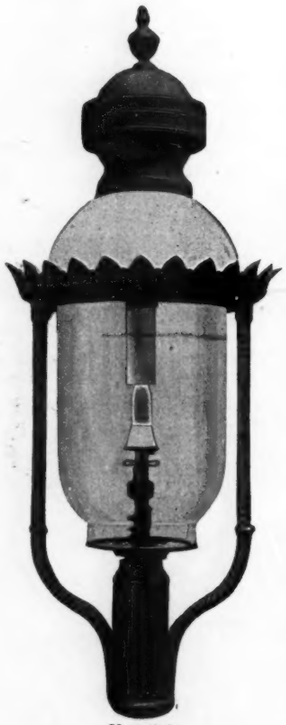

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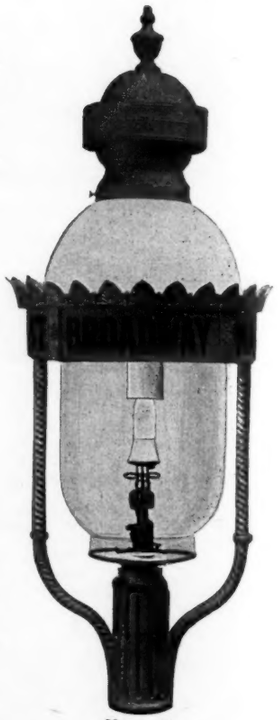

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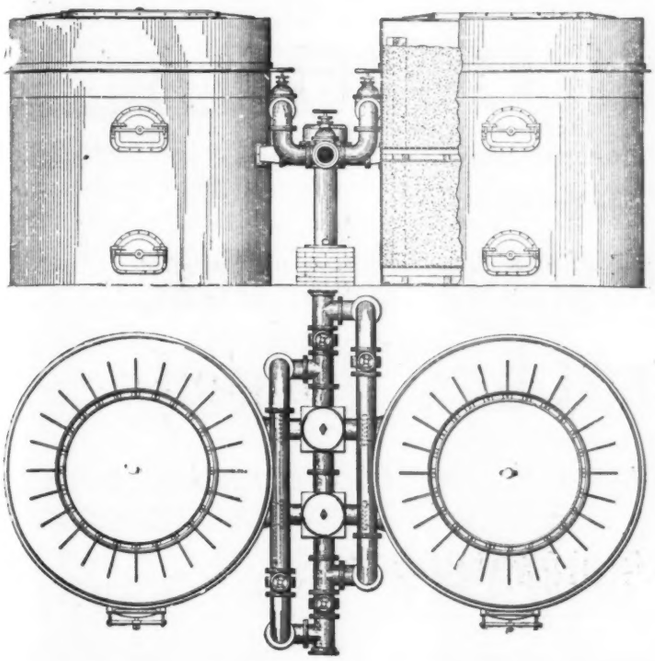

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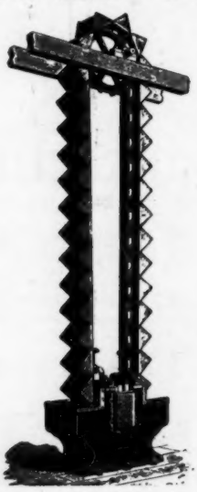

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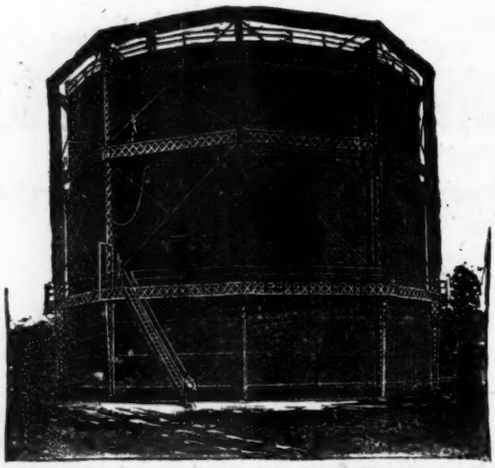

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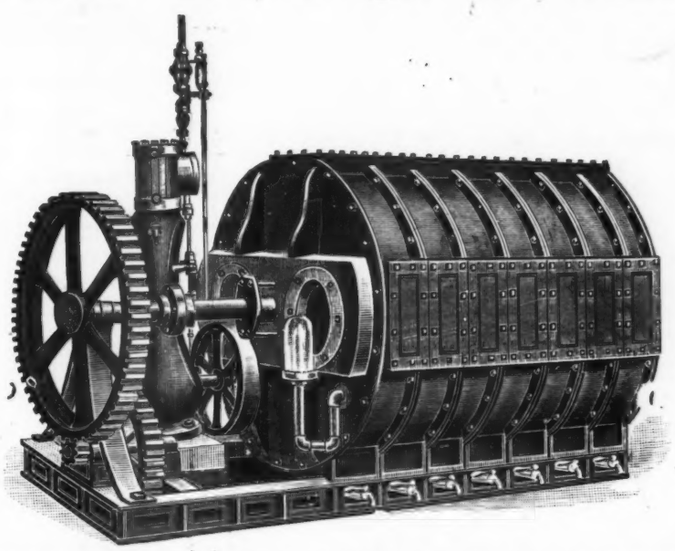

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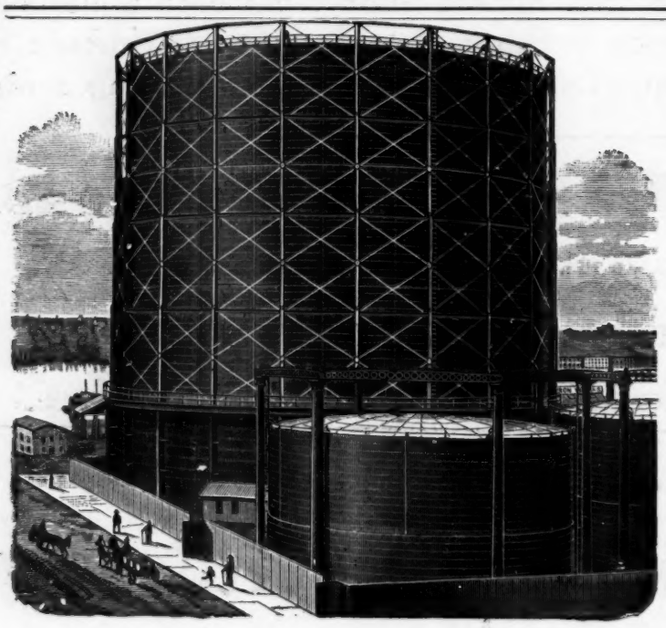

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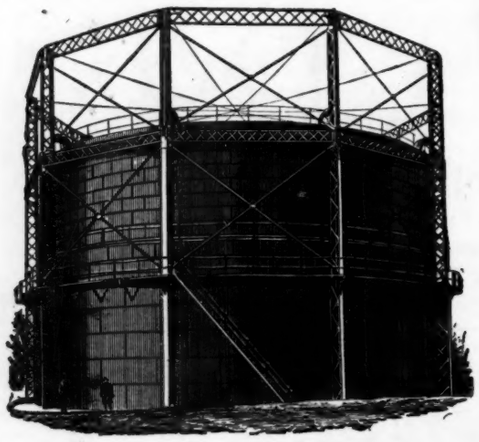

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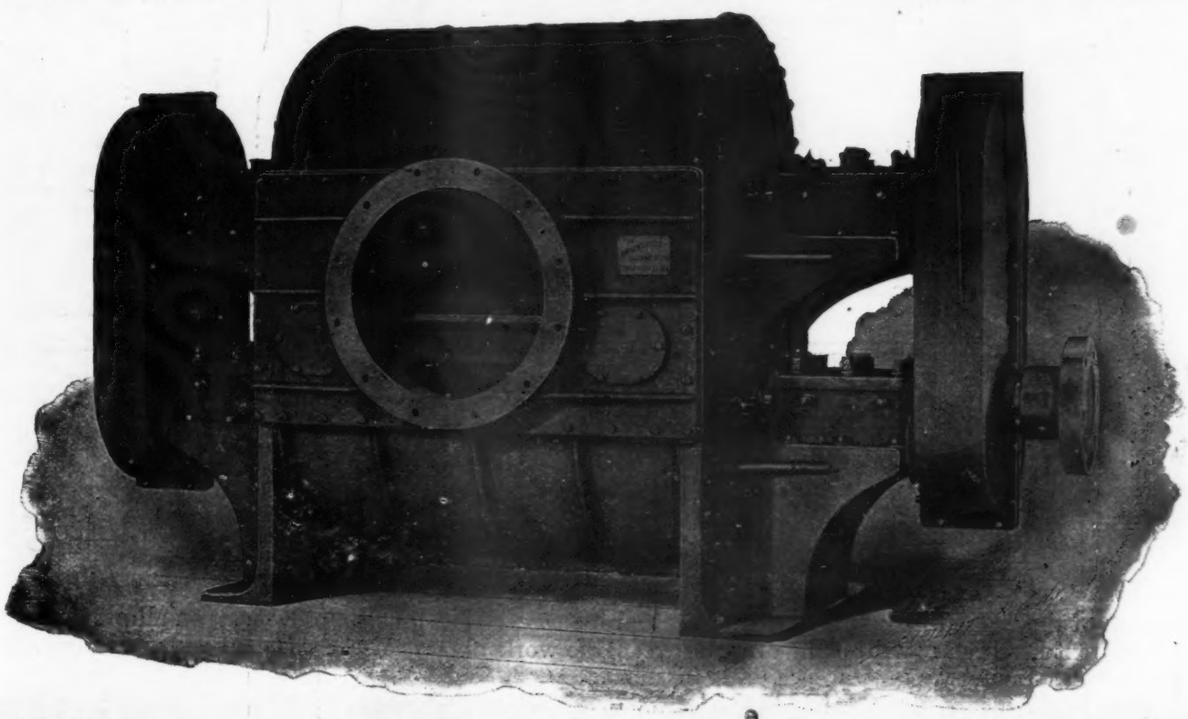

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